30612

National Library
of Canada

Bibliothèque nationale
du Canada

**CANADIAN THESES
ON MICROFICHE**

***THÈSES CANADIENNES
SUR MICROFICHE***

NAME OF AUTHOR/*NOM DE L'AUTEUR* BAUREISS Gunter

TITLE OF THESIS/*TITRE DE LA THÈSE* The Theory of Evaluative Orientation and the Socio-Technical System: A Study of Workers' Responses in an Industrial Training Program

UNIVERSITY/*UNIVERSITÉ* University of ALBERTA

DEGREE FOR WHICH THESIS WAS PRESENTED/ *GRADE POUR LEQUEL CETTE THÈSE FUT PRÉSENTÉE* Ph.D.

YEAR THIS DEGREE CONFERRED/*ANNÉE D'OBTENTION DE CE GRADE* 1976

NAME OF SUPERVISOR/*NOM DU DIRECTEUR DE THÈSE* Dr. Charles HOBART

Permission is hereby granted to the NATIONAL LIBRARY OF CANADA to microfilm this thesis and to lend or sell copies of the film.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

L'autorisation est, par la présente, accordée à la BIBLIOTHÈQUE NATIONALE DU CANADA de microfilmer cette thèse et de prêter ou de vendre des exemplaires du film.

L'auteur se réserve les autres droits de publication; ni la thèse ni de longs extraits de celle-ci ne doivent être imprimés ou autrement reproduits sans l'autorisation écrite de l'auteur.

DATED/*DATÉ* Oct. 19/76 SIGNED/*SIGNÉ* Gunter Baureiss

PERMANENT ADDRESS/*RÉSIDENCE FIXE* Department of Sociology, University of
Manitoba, WINNIPEG, Manitoba R3T 2N2

INFORMATION TO USERS

THIS DISSERTATION HAS BEEN
MICROFILMED EXACTLY AS RECEIVED

This copy was produced from a microfiche copy of the original document. The quality of the copy is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

PLEASE NOTE: Some pages may have indistinct print. Filmed as received.

Canadian Theses Division
Cataloguing Branch
National Library of Canada
Ottawa, Canada K1A 0N4

AVIS AUX USAGERS

LA THESE A ETE MICROFILMEE
TELLE QUE NOUS L'AVONS RECUE

Cette copie a été faite à partir d'une microfiche du document original. La qualité de la copie dépend grandement de la qualité de la thèse soumise pour le microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

NOTA BENE: La qualité d'impression de certaines pages peut laisser à désirer. Microfilmee telle que nous l'avons reçue.

Division des thèses canadiennes
Direction du catalogage
Bibliothèque nationale du Canada
Ottawa, Canada K1A 0N4

THE UNIVERSITY OF ALBERTA

THE THEORY OF EVALUATIVE ORIENTATION AND THE SOCIO-TECHNICAL SYSTEM: A STUDY OF WORKERS' RESPONSES IN AN INDUSTRIAL TRAINING PROGRAM

by

© GUNTER BAUREISS

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF SOCIOLOGY

EDMONTON, ALBERTA

FALL, 1976

THE UNIVERSITY OF ALBERTA
FACULTY OF GRADUATE STUDIES AND RESEARCH

The Undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled THE THEORY OF EVALUATIVE ORIENTATION AND THE SOCIO-TECHNICAL SYSTEM: A STUDY OF WORKERS' RESPONSES IN AN INDUSTRIAL TRAINING PROGRAM submitted by GUNTER BAUREISS in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

Charles W Hobart
Supervisor

John Young

Richard Jung

George K Jarvis

Michael Fullan
External Examiner

Date. October. 15, . 1976........

ABSTRACT

The objective of this dissertation was to interpret a set of data obtained for evaluation research of a Northern Training Program in the petroleum industry in terms of a general sociological theory. More than one hundred Inuit, Indians, and Whites of different cultural backgrounds primarily from the Northwest Territories of Canada were relocated for the purpose of on-the-job training for semi-skilled, skilled, and clerical occupations. Data relating to these trainees, their co-workers, and their supervisors were analyzed within the Socio-Technical Systems Theory and the Evaluative Orientation Theory.

The collected background characteristics of the trainees were conceptualized in the framework of ethnic relations, with the result that ethnicity could explain most of the variation of other background attributes of the trainees. Ethnicity, therefore, was employed as a control variable in the analysis of variance and found to affect the trainee's, the co-worker's, and the supervisor's evaluative orientation in some, but not in other regions.

The work situation of the trainees, their co-workers, and their supervisors was interpreted as an instance of the socio-technical system and regarded as a system of independent variables. Socio-technical system theory postulates the close interdependence of the technical system and the social system. It states, that different types of technology have an important effect on the worker's orientation towards the organization, his work associates, and his work.

Traditionally, the petroleum industry has been described as an example of continuous process technology. By distinguishing between continuous process, craft, drilling, and clerical technology within the petroleum industry, the analysis of this dissertation goes beyond the above conventional view.

The attitudes of the trainees and their work associates were interpreted as instances of evaluative orientation and considered as a set of dependent variables.

Parsons' notion of the instrumental and expressive complexes and their respective four major types of problems within the instrumental and expressive type of action-orientation were critically examined and modified. In addition, an ethical complex for Parsons' moral type of action-orienation was conceptualized on the same principle of social exchange as those of the instrumental and expressive complexes.

Jung's Theory of Telic Orientation (which postulates three simple and three combined systems) was introduced as it goes beyond Parsons' conceptualization by postulating the explanatory principle of management of uncertainty. According to this principle, an actor will accept from all available statements such definition of an action world that has minimum possible uncertainty, leading to gradients of uncertainty associated with each system. In the three combined systems, Jung defines minimum uncertainty as competence, normative determination (normativeness), and integration respectively.

Similarities between relevant aspects of Jung's theory of telic orientation and Parsons' evaluative orientation made it possible to transform the four major types of problems of the instrumental, the ethical, and the expressive complex into component concepts of Jung's gradients of uncertainty of competence, normativeness, and integration respectively. The component concepts' values and relations were formally specified by factor analysis; the resulting three factors were interpreted as constructs of the actor's evaluative orientation, subject to situational constraints.

The industrial setting, as a particular situation, provided the empirical testing ground. The postulate of the socio-technical system specified situations that place different constraints upon the actor's evaluative orientation, having permitted the formulation of specific propositions.

The findings supported empirically the formal multidimensionality of the three gradients of uncertainty. They substantiated the prediction of increasing degeneration of this formal structure when continuous process, craft, drilling, and clerical technology are separately factor analyzed. A further prediction was confirmed by analyzing the factor scores of the constructs according to type of technology: actors in different types of technology evaluate alters in different ways. It was concluded that different types of technology generate uncertainty differently.

Needless to say, the general sociological principles arrived at in this dissertation are not only applicable to the field of industrial sociology, but should be of paramount interest to researchers dealing with the actor's evaluative orientation in general.

ACKNOWLEDGEMENTS

I am most grateful to Dr. Charles Hobart, supervisor of this dissertation, under whose direction I collected the original data. He also provided valuable advice, criticism and prompt feedback throughout the period of the study.

I am indebted as well to Dr. George Jarvis, John Young, and Dr. Don Manuel for their useful suggestions.

To Dr. Richard Jung, who voluntarily offered his valuable time to help me in the theoretical and methodological aspects of this research, I owe my sincere gratitude. Without his effort, the developed theory and its application in this dissertation could not have been so successful.

The members of the Steering Committee of Canadian Arctic Gas Study Limited deserve thanks for giving me permission to use the collected data for this dissertation.

Last but not least, my wife Trudy gave invaluable assistance in the editing and correction of the drafts. To her goes also the credit for the excellent format the dissertation has taken.

TABLE OF CONTENTS

Chapter Page

1. INTRODUCTION 1

Organization of the Dissertation 3

2. HISTORY AND ORGANIZATIONAL STRUCTURE OF THE NORTHERN TRAINING TASK FORCE AND THE PROGRAM 7

HISTORY OF THE NORTHERN PETROLEUM TRAINING TASK FORCE (T.T.F.) 10

ORGANIZATIONAL STRUCTURE OF THE T.T.F. 12

COMPONENTS OF THE NORTHERN TRAINING PROGRAM 13

Government Involvement 13
Trainee's Special Benefits 14
Recruitment and Selection of Trainees 15
The Design of the Training Program 16
Orientation Courses for Northern Trainees and Supervisors. 17

THE NORTHERN TRAINEE AND OCCUPATIONAL SOCIALIZATION 17

SUMMARY 19

3. THEORY 21

THE SOCIO-TECHNICAL SYSTEM 22

The Petroleum Industry 23
Continuous Process Technology 25
Craft Technology 29
Drilling Technology 32
Clerical Technology 35
Summary 36

THE THEORY OF EVALUATIVE ORIENTATION 37

Jung's Six Systems of Telic Orientation 41
The Aesthetic System 42
The Moral System 42
The Religious System 42
The Pragmatic System 43

Chapter Page

The Ethical System 44
The Expressive System 45
Summary 45
Social Exchange: The Instrumental, the Expressive, and the Ethical Complexes 46
The Instrumental Complex 47
The Expressive Complex 50
The Ethical Complex 52
Interpretation of the Problems of Social Exchange as Components of Uncertainty 55

THE THEORY OF EVALUATIVE ORIENTATION AND THE SOCIO-TECHNICAL SYSTEM 58

Propositions I 59
Propositions II 60
Propositions III 62
Trainee's Evaluation 62
Co-Worker's Evaluation 64
Supervisor's Evaluation 68

SUMMARY 70

4. METHODOLOGY 72

CONCEPTS AND INDICES 73

Background Variables 74
Work Milieu Variables 75
Evaluative Orientation of the Actor 76
Trainee's Evaluative Orientation 76
Co-Worker's Evaluative Orientation 77
Supervisor's Evaluative Orientation 79

HYPOTHESES 80

FACTOR ANALYSIS, ANALYSIS OF VARIANCE AND COVARIANCE 82

Factor Analysis 82
Analysis of Variance and Covariance 83

DATA COLLECTION, CODING RESPONSES, DATA PROCESSING AND DATA ANALYSIS 84

Data Collection 84
Interview Procedures 85
Administration of Interview Schedules 86
Coding Responses 89
Data Processing and Data Analysis 89

Chapter Page

SUMMARY 90

5. BACKGROUND CHARACTERISTICS OF CONTINUING AND TERMINATED NORTHERN TRAINEES 92

DEMOGRAPHIC BACKGROUND CHARACTERISTICS OF NORTHERN TRAINEES 92

Age Distribution 92
Ethnicity 93
Marital Status and Number of Dependents 94
Education 94
Employment History 97
Residence at Time of Recruitment 97
Southern Experience 99

CONTRASTIVE BACKGROUND CHARACTERISTICS OF NORTHERN TRAINEES 100

Education and Ethnicity 100
Home Region and Ethnicity 101
Southern Exposure and Ethnicity 103
Education and Home Region 104
Education and Southern Experience 105

SUMMARY 106

6. THE EMPLOYMENT SETTING OF NORTHERN TRAINEES: THE SOCIO-TECHNICAL PERSPECTIVE 108

Employing Companies 108
Training Locations 111
Type of Technology and Training Occupations 115
  Continuous Process Technology 115
  Craft Technology 117
  Drilling Technology 120
  Clerical Technology 123
Reasons for Termination 124
Summary 126

7. THE SOCIO-TECHNICAL SYSTEM AND THE ACTOR'S EVALUATIVE ORIENTATION 128

THE TRAINEE'S EVALUATIVE ORIENTATION 129

Trainee's Evaluative Orientation as a Group 129
  Factor 1: Integration 129
  Factor 2: Competence 132
  Factor 3: Normativeness 132

Chapter Page

Conclusion 133
Trainee's Evaluative Orientation
by Type of Technology 133
Continuous Process Technology 134
Craft Technology 136
Drilling Technology 138
Clerical Technology 141
Conclusion 143

THE CO-WORKER'S EVALUATIVE ORIENTATION 144

The Co-Worker's Evaluative Orientation
as a Group 144
Factor 1: Normativeness 144
Factor 2: Competence 146
Factor 3: Integration 147
Conclusion 148
Co-Worker's Evaluative Orientation
by Type of Technology 150
Continuous Process Technology 150
Craft Technology 150
Drilling Technology 154
Clerical Technology 156
Conclusion 159

THE SUPERVISOR'S EVALUATIVE ORIENTATION 160

The Supervisor's Evaluative Orientation
as a Group 160
Factor 1: Integration 162
Factor 2: Competence 162
Factor 3: Normativeness 163
Conclusion 163
Supervisor's Evaluative Orientation
by Type of Technology 164
Continuous Process Technology 164
Craft Technology 166
Drilling Technology 170
Clerical Technology 173
Conclusion 173

SUMMARY AND DISCUSSION 175

8. THE SOCIO-TECHNICAL SYSTEM AND THE ACTOR'S EVALUATION 179

The Trainee's Evaluation of the
Work Situation 180
Competence 180
Normativeness 182

Chapter Page

Integration 184
Summary 185
The Co-Worker's Evaluation of the Trainee 187
Competence 187
Normativeness 188
Integration 189
Summary 191
The Supervisor's Evaluation of the Trainee 193
Competence 193
Normativeness 194
Integration 195
Summary 196
Summary 198

9. SUMMARY AND CONCLUSIONS 201

BIBLIOGRAPHY 220

APPENDICES 224

A. ABRIDGED INTERVIEW SCHEDULES 225

B. SUPPLEMENTARY TABLES 1 - 7 230

C. T.T.F. SUPPLEMENTARY INFORMATION 241

LIST OF TABLES

Table Page

5-1 Age Distribution of Continuing and Terminated Trainees 93

5-2 Ethnicity of Continuing and Terminated Trainees 94

5-3 Marital Status and Number of Dependents of Continuing and Terminated Trainees 95

5-4 Years of Formal Education of Continuing and Terminated Trainees 96

5-5 Home Region at Time of Recruitment for Continuing and Terminated Trainees 99

5-6 Educational Categories by Ethnicity of Northern Trainees 100

5-7 Home Region by Ethnicity at Time of Recruitment of Northern Trainees 102

5-8 Southern Exposure and Ethnicity of Northern Trainees . . 103

5-9 Previous Employment in the South and Ethnicity of Northern Trainees 104

5-10 Education by Home Region of Northern Trainees 105

6-1 Employing Companies for Continuing and Terminated Trainees 110

6-2 Employing Companies by Type of Technology of Northern Trainees 111

6-3 Employing Companies and Training Regions of Northern Trainees 113

6-4 Training Locations by Regions for Continuing and Terminated Trainees 114

6-5 Training Occupations of Continuing and Terminated Trainees 116

6-6 Reasons for Termination and Number of Terminees to whom each Applied 125

Table		Page
7-1	Factor Structure of Trainee's Evaluative Orientation by Integration, Competence, and Normativeness	130
7-2	Factor Structure of Trainee's Evaluative Orientation in Continuous Process Technology	135
7-3	Factor Structure of Trainee's Evaluative Orientation in Craft Technology	137
7-4	Factor Structure of Trainee's Evaluative Orientation in Drilling Technology	139
7-5	Factor Structure of Trainee's Evaluative Orientation in Clerical Technology	142
7-6	Factor Structure of Co-Worker's Evaluative Orientation by Normativeness, Competence, and Integration	145
7-7	Factor Structure of Co-Worker's Evaluative Orientation in Continuous Process Technology	151
7-8	Factor Structure of Co-Worker's Evaluative Orientation in Craft Technology	152
7-9	Factor Structure of Co-Worker's Evaluative Orientation in Drilling Technology	155
7-9a	Factor Structure of Co-Worker's Evaluative Orientation in Drilling Technology	157
7-10	Factor Structure of Co-Worker's Evaluative Orientation in Clerical Technology	158
7-11	Factor Structure of Supervisor's Evaluative Orientation by Integration, Competence, and Normativeness	161
7-12	Factor Structure of Supervisor's Evaluative Orientation in Continuous Process Technology	165
7-13	Factor Structure of Supervisor's Evaluative Orientation in Craft Technology	167
7-13a	Factor Structure of Supervisor's Evaluative Orientation in Craft Technology	169
7-14	Factor Structure of Supervisor's Evaluative Orientation in Drilling Technology	171
7-14a	Factor Structure of Supervisor's Evaluative Orientation in Drilling Technology	172

Table Page

7-15 Factor Structure of Supervisor's Evaluative Orientation in Clerical Technology 174

8-1 Trainee's Competence Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group 181

8-2 Trainee's Normativeness Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group 183

8-3 Trainee's Integration Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group 185

8-4 Co-Worker's Competence Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group 188

8-5 Co-Worker's Normativeness Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group 190

8-6 Co-Worker's Integration Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group 190

8-7 Supervisor's Competence Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group 194

8-8 Supervisor's Normativeness Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group 195

8-9 Supervisor's Integration Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group 198

LIST OF FIGURES

Figure Page

5-1 Home Residence of Northern Trainees 98

6-1 Training Locations of Northern Trainees 112

8-1 Mean Evaluation Scores of Trainees by Type of Technology 186

8-2 Mean Evaluation Scores of Co-Workers by Type of Technology 193

8-3 Mean Evaluation Scores of Supervisors by Type of Technology 197

Chapter 1

INTRODUCTION

In 1971-74, a group of more than hundred Inuit, Indians and Whites of different cultural backgrounds primarily from the Northwest Territories of Canada were relocated, mainly to Alberta, Canada, for the purpose of on-the-job training for semi-skilled, skilled and clerical occupations in the petroleum industry. In the context of evaluation research, they were asked some 110 questions about their previous educational background, work, and exposure to the South, and about their attitudes towards the work organization, their job, and their work associates. Their co-workers and immediate supervisors were also questioned, primarily about the trainee's work performance and his attitudes towards his job and his work associates.

The objective of this dissertation is to explain the specific set of data obtained as a reflection of a general sociological phenomenon.[1] For this purpose, the background of the trainees is conceptualized in the framework of sociology of ethnic relations; the work situation of the trainees is interpreted as an instance of the socio-technical system as elaborated by industrial sociology; and the attitudes of the trainees and their co-workers and supervisors are interpreted as instances of evaluative orientation as developed by Talcott Parsons and Richard Jung. To transform the raw data into formal theoretical constructs, factor analysis is employed as a method particularly suited for conceptual and theoretical inductive generalization.

---

[1] The data have been analysed for the purpose of evaluation of the program and the results have been reported in: Hobart, Charles assisted by Gunter Baureiss: An Evaluation of a Training Program, 1975, Nortran, Edmonton.

The format of analysis is to postulate relations between the major concepts resulting from the general interpretation of the phenomenon. These propositions are then translated into hypotheses about relations between factors. The results of the factor analysis are compared with the hypotheses and some additional analyses are performed. The ethnic background of the trainees is regarded as the control variable, aspects of the socio-technical system of the petroleum industry as a system of independent variables, and indicators of the evaluative orientation of the trainee as a set of dependent variables. The evaluative orientations of co-workers and supervisors are interpreted as reflecting the institutionalized order of the petroleum industry.

The significance of this dissertation lies in the application of the theory of evaluative orientation to the industrial setting. Relevant aspects of Parsons' and Jung's work are combined and/or modified. Parsons' notions of instrumental and expressive complexes of orientation and the ethical complex to be developed in this dissertation are interpreted within the frame of Jung's explanatory principle of uncertainty to explain the specific set of data.

Furthermore, the theory of evaluative orientation is combined with the basic postulate of socio-technical system theory. The latter states that different types of technology set different constraints upon the actor's evaluative orientation and his evaluation of alters. The postulate, when applied to the theory of evaluative orientation within the industrial setting, points to the variability of the formal structure of the instrumental, ethical, and expressive complexes as well as to the variability of factual content of evaluation according to different types of technology.

Organization of the Dissertation

Chapter 2 of the dissertation provides the historic and situational context of the Northern Training Program. It describes the organizational structure of the Training Task Force, and of the components of the program. More specific issues, such as government involvement, trainees' special benefits, recruitment and selection of trainees, and specially designed orientation courses for the trainees and their respective supervisors are also dealt with.

Chapter 3 develops the theoretical system intended to explain the phenomenon under study. First, the chapter locates the petroleum industry within the context of the literature of industrial sociology relating to socio-technical systems. The petroleum industry is distinguished from other industries by its characteristics of continuous process technology. The chapter goes beyond current discussions by distinguishing four types of technology within the petroleum industry: continuous process, craft (including maintenance), drilling, and clerical technologies.

The second major section consists of the development of the theory of evaluative orientation, starting with Parsons's work and introducing Jung's three major sub-systems of telic orientation. Next, Parsons' notions of instrumental and expressive complexes of orientation are combined with Jung's relevant sub-systems, and an ethical complex of orientation is formulated.

Finally, the theory of evaluative orientation is then combined with the theory of the socio-technical system and specific propositions about the relations between the two are formulated.

Chapter 4 is devoted to methodology, defined broadly as including the formation of indices and the deduction of hypotheses. Corresponding to the theoretical formulation, background variables are treated as control variables, the work milieu as independent variables, and the evaluative orientation as the dependent variables. Factor analysis is discussed as a method for the formulation of theoretical constructs, as a method of establishing empirical relations between the indicators of evaluative orientation, and as a method for reducing the complexity of the data. Although factor analysis has been primarily employed for the last purpose, the first two uses are of specific interest in this study. In the same chapter, the conventional methodological topics, such as data collection procedures, coding of responses, and techniques used to analyse the data are also dealt with.

Chapter 5 deals with the background characteristics of the northern trainees. It analyses the demographic characteristics of the trainee such as age, ethnicity, marital status, education, employment history, residence, and southern experience. In addition, it discusses differences between continuing and terminated trainees on these characteristics.

Chapter 6 discusses in some detail the employment setting of the northern trainees in the context of the literature of industrial sociology. In particular, the setting is related to the key features of the socio-technical system.

Chapter 7 deals with the formal aspects of the trainee's, the co-worker's and the supervisor's evaluative orientation. Factor analysis is used for the formulation of theoretical constructs and as a method of establishing empirical relations between indicators of evaluative orientation. Twelve indicators relevant to the trainee, the co-worker, and the supervisor respectively are factor analysed, and the resulting three factors are interpreted.

In addition, as the socio-technical system is treated as the independent variable, separate factor analyses for each type of technology for the trainee, the co-worker, and the supervisor are performed and discussed.

The hypotheses predicting the relations between factors for each specific analysis are tested by visual matching and the results of the assessment are presented.

The chapter is divided into three major parts. First, the questionnaire items reflecting the evaluative orientation of the trainees as a group are factor analysed and the same data are also analysed according to the type of technology. Secondly, the co-workers' indices are analysed by the same method as a group, and again by the type of technology separately. In the third part, the above procedures are repeated for the immediate supervisors of the trainees. At the end, the findings are summarized and the analysis is concluded with a general discussion.

Chapter 8 examines the factual content of the trainee's, the co-worker's, and the supervisor's evaluative orientation. The factor scores for the trainee, the co-worker, and the supervisor form the dependent variables. Analyses of variance and covariance are used to test the hypotheses about the relations between the types of technology, ethnicity, size of work group, and the group mean evaluation scores.

Chapter 9 contains the summary, conclusions, and discussion of the implications of the findings from this study.

Chapter 2

HISTORY AND ORGANIZATIONAL STRUCTURE OF THE NORTHERN TRAINING TASK FORCE AND THE PROGRAM

The natives of the Canadian North of today find themselves in a transitional period. Whereas prior to white contact they enjoyed an integrated and viable social network (Jenness 1918 and Whittaker 1939), in recent years cultural diffusion and thereby dependence upon the life style of the white man has become more dominant. The educational system and the recent introduction of mass communication by the Canadian government, as well as industrial northern developments have affected their traditional life styles. Though natives have become more familiar with the industrial wage economy, the North has so far offered at best seasonal employment to its native people. Such employment pattern can be attributed partly to the regional climate and the cultural patterns of the natives, but primarily so to the lack of opportunities made available in small settlements. Permanent employment is typically available only to people in occupations that require several years of training and geographic mobility is a must.

In the Mackenzie Delta, for instance, the employment rate in 1972 was 69 per cent (60 per cent for males only) within the working age population (Gemini North, 1974:407,412). These relatively low employment figures, however, are misleading inasmuch as they are calculated on a yearly basis; in fact, in seasonal employment very few are unemployed during the peak seasons.

> It can be inferred from this apparent contradiction that although the full-time, year-round employment rate is fairly low, the seasonal rate may well be very high (Gemini North, 1974:410).

However, barriers remain with regard to the participation of the natives in the wage-oriented labour force. Ties to traditional economic activities, at least on a part-time or seasonal basis, are strong. Skill levels, compared to national averages, are low. The nature, location, and duration of job opportunities which are attractive to native northerners in particular are restricted. A relatively small population, scattered across a vast area, reduces the training potential unless the individual is willing to move to larger centers. Job opportunities are very limited as wage employment on the local level is confined to unskilled occupations. Therefore, formal education received may be of little use in the native's home settlement - a problem, especially as most men and women still prefer to work in or near their home communities (Gemini North, 1974:417). Other barriers to employment are the lack of documented work history, lack of education beyond grade school, and the cultural values of a wage economy which are at variance with traditional values.

These and other factors limit the participation of northerners in the labour force, and consequently affect the supply of northern labour available for northern development at the present time.

The pertinent issue confronting the native in a wage economy is well stated in the following conclusion:

> When viewed within the context of the obstacles faced by native northerners who desire to find wage employment, it is to their credit that so many manage to find, retain and perform their jobs so successfully (Gemini North, 1974:427).

Various attempts have been made to integrate the natives of the Territories into the southern wage economy. Facilities, however, especially on the local community level, have been inadequate and opportunities for permanent employment have been infrequent and scarce.

As a result of the present oil exploration in the Mackenzie Delta and the planning toward construction of a Mackenzie gas pipeline, a consortium of oil companies (Canadian Arctic Gas Study Limited) introduced a formalized program to train northerners in certain occupations which will be needed for the commercial development and transmission of gas deposits in the North.

Since training facilities for most of the occupations do not yet exist in the North, the Northern Training Program relocates northerners, especially native northerners, to Alberta and Saskatchewan for on-the-job training. Some trainees are, however, being trained in the Mackenzie Delta and a few at Norman Wells.

This effort is in conformity with the Guidelines Governing Northern Pipelines issued by the federal government's Department of Indian Affairs and Northern Development and the Department of Energy, Mines and Resources on June 28, 1972, which state:

> The Applicant must undertake specific programs leading to the employment, at all occupational levels, of residents of the Territories - and in particular native people, during the construction and operation of the pipeline.
>
> Priority placement in jobs shall be accorded native people of the Territories in keeping with the tenor of Article 5 of the International Labour Organization Convention 111, 1958, ratified by Canada, and the government's intent to increase employment opportunities for members of disadvantaged minority groups.

These Guidelines also encourage formal educational upgrading, skill training, and other forms of integrated training that includes on-the-job work experience. This is to be achieved in cooperation with the respective government agencies.

HISTORY OF THE NORTHERN PETROLEUM TRAINING TASK FORCE (T.T.F.)

In the early 1970's, a number of major petroleum companies recognized the value of a co-ordinated and co-operative approach to training and employment in their far northern operations. Canadian Arctic Gas Co. Ltd., as a potential employer of some significance in the North, suggested that a task force be organized for the planning and development of a comprehensive training program for the petroleum industry. A steering committee of the companies involved at that time was formed in May 1973, consisting of The Alberta Gas Trunk Line Company Limited (AGTL), Canadian Arctic Gas Study Limited (CAGSL), Gulf Oil Canada Limited (Gulf), Imperial Oil Limited (Imperial), and Shell Canada Limited (Shell). Trans-Canada Pipelines Limited (TCP) joined this group later. The objective of the steering committee was to provide policies and directives for the Training Task Force which would guide the planning and implementation of a program. The T.T.F. was inaugurated in April of 1973. Plans and recommendations were forwarded to the steering committee for its consideration in August 1973, which resulted in a petroleum industry training program for northern residents. The plan took into consideration the study carried out by the Boreal Institute of Northern Studies of the University of Alberta, and relied extensively on the experience of Alberta Gas Trunk Line in its training program for northern residents in pipeline operations and maintenance, which had begun in 1971.

The Training Task Force developed the following objectives:

1. To develop a comprehensive plan for training programs, designed to provide continuing employment opportunities for northerners.

2. To include northerners in the planning and implementation of training programs.

3. To cooperate with territorial government departments in order that the respective governments may assume the major responsibility for administering and operating the training programs at the earliest practical date.

In 1973, 73 positions were made available by the participating companies, with the exception of Alberta Gas Trunk Line. All of these positions were filled by northern residents during the months of October and November of that year. At the same time, Alberta Gas Trunk Line, who had been operating its own northern training program since 1971, transferred its trainees to the jurisdiction of the T.T.F.. By autumn 1974, 23 more positions were added. Of these, Trans Canada Pipeline provided eight openings in gas transmission stations in Saskatchewan, and the remaining 15 were junior accounting-clerical positions with Gulf, Imperial, and Shell. The training program will probably stabilize at approximately one hundred trainees until such time as approval for construction of a Mackenzie gas pipeline is apparent.

ORGANIZATIONAL STRUCTURE OF THE T.T.F.

The organization of the Training Task Force consists of eight persons and secretarial personnel: the manager, two Industry Training Coordinators, the Training Supervisor, and four Supervisor Counsellors.

The manager is responsible for the entire organization, but primarily gives directives to the Training Supervisor and the Industry Training Coordinators.

The Industry Training Coordinators' function is to assess the trainee's educational level, to suggest possible courses he might take to upgrade his education, and to introduce to the trainee and his/her supervisory personnel what is known as the DACUM system. Together with representatives from industry, they select trainees, develop suitable entrance requirements, performance standards, job specifications, and identify weaknesses in the trainee's performance, suggesting specialized training that would best facilitate the trainee's training progress.

The Training Supervisor is responsible for the supervision of four Supervisor Counsellors, and often serves as "trouble shooter" when problems arise. He is also involved in the selection of trainees. In general, he is responsible for the well-being of the northern trainees.

The Supervisor Counsellors are responsible for groups of fifteen to twenty trainees. It is their responsibility to assist the trainees in finding suitable quarters in the southern industrial environment, and to help them adapt to a wage economy in the South or in the Mackenzie Delta. The T.T.F. originally hired three Supervisor Counsellors. A fourth was added in spring of 1974. All of these

Supervisor Counsellors are persons experienced in dealing with northerners. They themselves were born and have lived most of their lives in Northern Canada. All but one are of native origins.

These T.T.F. officials operate in areas and on issues which leave their fairness, their goals, and their judgement open to questioning by people with different interests. Since the T.T.F. coordinates several participating companies, its officials are under pressure, on the one hand, to support the recommendations and actions of their Supervisor Counsellors on behalf of the northern trainees. Yet, on the other hand, they must maintain cordial relations with officials of the participating companies, who, after all, provide the support for the T.T.F. organization, but who may on occasion find themselves in opposition to T.T.F. proposals and recommendations.

COMPONENTS OF THE NORTHERN TRAINING PROGRAM

There are five components of the Northern Training Program that deserve brief discussion: (1) government involvement, (2) trainees' special benefits, (3) recruitment and selection of trainees, (4) design of the training program, and (5) orientation programs for trainees and supervisors.

Government Involvement

The costs of manpower development in any organization are considerable. When problems inherent in geographic and cultural isolation are added to normal manpower problems, costs can be expected to increase. For this reason, the T.T.F. held discussions with representatives of the territorial government and the federal government's

Departments of Manpower and Immigration, and Indian and Northern Affairs, in order to explore the possibility of sharing the costs of this comprehensive industry-based program. Canada Manpower agreed to underwrite 60 per cent of the direct wage costs of those trainees who are deemed eligible and acceptable under their (Canada Manpower's) criteria. Out of 73 training positions, the T.T.F. has negotiated 50 contracts with the Canada Manpower Centers and three with the government of the Northwest Territories. The Canada Manpower Centers have also paid the major portion of the cost of the Basic Job Readiness Training, including the cost of training, trainee transportation to the Adult Vocational Training Center in Fort Smith, and Canada Manpower Center allowances. The governments of the Northwest Territories and the Yukon also contributed to the program by each authorizing secondment of a person to the Training Task Force to help in planning and implementation.[1]

Trainees' Special Benefits

The northern trainees are seen to be the recipients of some special benefits that are not available for regular employees. They are entitled to special training and accelerated advancement.

For those trainees who are relocated, transportation to the training location is fully paid. In addition, they accrue special benefits that are modelled on the companies' relocation program existing around the world. The trainees thus receive an additional week of yearly vacation time to allow them to return home, plus reimbursement for 50 per cent of the travel expense. They are entitled to subsidized housing and transportation to the place of work where necessary.

---

[1] The Yukon government recently withdrew its support.

Those trainees who are employed in the Mackenzie Delta live in camps and are being flown home on off-shifts, as are regular workers. This is not considered as a special benefit, though they are entitled to special training and accelerated advancement.

Recruitment and Selection of Trainees

The recruitment and selection procedure is costly and time-consuming. T.T.F. officials and Canada Manpower officials travel across the Northwest Territories and the Yukon as a team, presenting illustrated lectures in high schools and distributing information pamphlets to potential trainees. They hold discussions with community leaders and make use of informal grape-vine networks through already employed trainees or other individuals known to them.

The criteria for selection have been modified to suit the northern conditions. They are described in a circular reproduced below:

> The Training Task Force obtained agreement from the participating companies that normal "southern" entry requirements in regard to education would not apply to northern trainees. Accordingly, the following criteria were applied in selection of trainees:
>
> 1. Good physical and mental health
> 2. Semi-skilled occupations (e.g. equipment operators, roughneck-derrickman, etc.) Grade 8 - 9
>   Skilled occupations (e.g. technicians, plant operators, etc.) Grade 9 - 10
>   Clerical - Accounting positions, Grade 11 - 12 or post-secondary training
> 3. Mature attitude towards training and employment
> 4. Previous education and/or work record indicative of some stability and motivation
> 5. Recommendations of past employers, employment agencies, etc..

Many of these criteria are highly subjective and cannot be applied in an objective fashion. Considerable judgement must be exercised and all available information concerning applicants must be carefully considered.

The Design of the Training Program

It is apparent that the plan design of the Northern Training Program is a very flexible arrangement intended to cover a widely varying range of training situations. At the one extreme, participating companies have carefully worked out training programs of long standing. In these situations the northern trainees are placed in equal position with the regular company trainees and are exposed to the same training experience. At the other extreme, trainees fill positions for which no training program had ever been designed. In such cases, the quality of training depends upon the initiative, discretion, and commitment of the supervisor or lead man to whom the trainee is assigned.

In the hope of streamlining the quality and extent of training, the T.T.F. has introduced a training system or plan called DACUM, which was researched by NOVA SCOTIA NEWSTART. The core of the system is the occupational analysis chart which represents in detail the various skill levels within each occupation. The DACUM system has been designed by industry experts from the participating oil companies.[1] So far, 21 types of occupations have been analysed in this manner. There are, however, training positions in a number of areas for which relevant DACUM charts are not yet in existence.

The objective of the DACUM system is twofold. Firstly, the system is used as a monitoring device and evaluation instrument for the

---

[1] One example of a DACUM chart is reproduced in Appendix C.

T.T.F. in situations where carefully worked out formal programs are in existence. Secondly, in locales where such formal programs are not operative, the utility of the DACUM chart goes beyond these functions, and provides supervisors and co-workers with guidance in terms of sequential ordering of the training tasks and assessment of the trainee's skills. The actual training of the northern trainees ultimately rests in the hands of the co-workers and supervisors as they possess the knowledge and skills to be passed on.

Orientation Courses for Northern Trainees and Supervisors

Orientation courses for northern trainees, held twice a year in the Northwest Territories, have become a significant part of the Northern Training Program. They are intended to ease the trainee's transition from the place of recruitment to that of employment, and provide the trainee with knowledge about the training program and its objectives.

In addition, an Industry Supervisor Seminar has been introduced by the T.T.F.. Its objective is to familiarize supervisors with the Northern Training Program, to provide understanding and appreciation of potential problems, to encourage discussion of existing problems, and to formulate possible solutions. It also serves as a feed-back mechanism to the T.T.F. in that certain policies may be changed as a result of the supervisors' input at these seminars.

Both, trainees and supervisors, are presented with the major components of the training program during the orientation courses. (See Appendix D)

THE NORTHERN TRAINEE AND OCCUPATIONAL SOCIALIZATION

Within the field of majority-minority relations, ethnic groups receive much consideration because relations among such groups have been perceived as sources of friction and conflict. There are numerous studies of ethnic relations or of status differences by ethnicity. For studies on Canadian natives see particularly Cardinal (1969), Elliott (1971), Frideres (1974), Hawthorn (1966), Porter (1967), and Scheffe (1970). However, systematic investigation of Indians and Inuit working within a predominantly white wage economy have been rare (Williamson, 1974). In fact, I am not aware of any available study where relocation of these ethnic groups for training to a number of different locations has taken place, and where training effort has been centralized and supervised. In short, the absorption of local labour into the wage economy is not new. However, relocation of northerners away from their homes for extended job training with the hope of eventual return to their home districts, under conditions of uncertain employment, has to my knowledge never before been attempted in Canada.

On-the-job training within the petroleum industry has been the standard procedure (Blauner, 1967:145). The constant turnover of personnel and the expansion of the industry require new employees to become familiar with the organizational structure and the specific skills of particular occupations. For many occupations, indeed, formal training programs outside of the petroleum industry do not exist. On-the-job training assigns to the small work group the task of achieving two distinct organizational goals: the carrying out of operational tasks that contribute to the production of the organization's output, and the socialization and training of new members so they can become effective and efficient members of the work group. Caplow stresses the point that:

> . . . training, like education, is never limited to its nominal objective. Organizations that conduct training programs conceive of them as imparting skills, but analysis of any particular training program always shows it to be concerned with the communication of values, the development of ambience, the rejection of prior affiliations, and the development of an appropriate self-image (Caplow, 1964:173).

The homogeneity of the trainees cannot be assumed because many northerners have been socialized in a variety of traditions. Having grown up in relatively isolated northern settlements, the trainee may well be unfamiliar with certain cultural patterns on which the organizational structure of industrial work is built. As expectations between northern trainees and their work associates may differ greatly, the heterogeneity regarding the trainee's background will be explored and correlated with the trainee's orientation towards the employer and his work associates.

SUMMARY

Historically, interested native residents of the Northwest- and Yukon Territories of Canada had neither the opportunity nor the skills to partake in the economic activity taking place around them, with the exception of activities related to living off the land. Under the present prevailing economic conditions in the North, more northerners are now opting for wage employment.

However, barriers remain with regard to the participation of the natives in the wage-oriented labour force: lack of educational and training facilities in local regions, lack of job opportunities in local settlements, and ties to traditional economic activities, at least on a part-time or seasonal basis, are major contributors to the low employment of northerners.

In 1973, a consortium of oil companies (Canadian Arctic Gas Study Limited) in cooperation with the territorial and federal governments, introduced a formalized Northern Training Program to train interested northerners in certain semi-skilled, skilled, and clerical occupations which will be needed for the commercial development and transmission of gas deposits in the North.

Since training facilities for most of the occupations do not yet exist in the North, the Northern Training Program recruits, selects, and relocates northerners from their home communities for industrial training purposes on a semi-permanent basis.

Chapter 3

THEORY

This chapter develops the theoretical perspective that is intended to explain the phenomenon under investigation.

First, the theory of the socio-technical system is introduced. The theory of the socio-technical system postulates that industries with different types of technology exhibit a different social structure and coordinate their work processes differently. Consequently, the type of technology of the worker partially determines the worker's orientation towards his work milieu. Traditionally, the petroleum industry has been described as an example of continuous process production. The analysis in this dissertation goes beyond this conventional view by distinguishing different types of technology within the petroleum industry.

The second major section of this chapter deals with the exposition and modification of the theory of evaluative orientation, starting from T. Parsons' work and introducing R. Jung's six sub-systems of telic orientation. In addition to Parsons' instrumental and expressive complexes of orientation, an ethical complex of orientation is formulated. Then, these three complexes of orientation are interpreted as Jung's explanatory principle of uncertainty governing the process of evaluative orientation.

Finally, the theory of evaluative orientation is combined with the theory of the socio-technical system and specific propositions about the relation between the two are formulated.

THE SOCIO-TECHNICAL SYSTEM

The concept of a socio-technical system refers to the close interdependence of a specific technology and the worker's orientation towards the organization, his work associates and his work. Various writers have suggested that the type of technology employed in industrial organizations has an important effect on its social structure, the coordination of work processes, and the means by which these are accomplished (Touraine, 1955, 1962; Mann and Hoffman, 1960; Faunce, 1965; Woodward, 1970; Emery and Trist, 1969; Fullan, 1970).

Emery and Trist (1969) emphasize that the study of a productive system requires detailed attention to both the technological and social components. They continue by saying that:

> The technical system sets certain requirements of its social system and the effectiveness of the total production system will depend upon the adequacy with which the social system is able to cope with these requirements (Emery and Trist, 1969:423).

To follow the above authors, four types of industrial technology can be distinguished: craft, machine-tending, assembly-line work, and continuous process production. The petroleum industry has been characterized as a contemporary example of the continuous process (Woodward, 1965; Blauner, 1967; Fullan, 1970). The production of liquids or gases through the various stages until it reaches the consumer requires a high capital investment per worker and skilled operators to control the highly automated process (Woodward, 1965:54; Blauner, 1967:125).

Past research has concentrated on the comparison between organizations with various types of industrial technology. Woodward's major objective was to study the relationship between technology and organizational structure. Unit and small batch production, large batch and mass production, and process production have been analysed in terms of number of employees, levels of management, labour costs, ratio of managers and supervisory staff to total personnel, ratio of staff and line personnel within the organizations, span of control, and the developing, marketing and production of the material. Blauner's research deals with the relationship between technology and the worker's alienation, using the Roper-Fortune Survey Questionnaire and a study of a chemical company (Blauner, 1967). He analyses the worker's orientation in four types of industries: printing, textiles, automobile, and chemical. I shall draw heavily on this study in building the theoretical base of this investigation.

The Petroleum Industry

As any other industry, the petroleum industry is a complex organization internally differentiated on the basis of the worker's relation to the production process. In terms of manpower, the operation of petro-chemical plants and compressor stations is outweighed by the large number of employed personnel in the drilling and exploration field and the clerical employees in the central offices. However, even in the continuous process operations, the function of the maintenance worker must not be underestimated. His relationship to the industrial technology is sufficiently different from that of the operator to warrant separate recognition in the analysis of continuous process production. Blauner recognizes the different function of the maintenance worker within the continuous process technology to a certain extent, but includes him with other operators in the final analysis (Blauner, 1967:124-165). Guided by the limits of the investigation of northern trainees, and the restriction to one industry, the petroleum industry, I distinguish four groups of employees who work in a different socio-technical system. (1) The operator, who supervises the continuous process in a plant or compressor station which involves the automatic, centralized control of an integrated production system and handles the material by remote control through processing units. His task is to take readings, and make inspections and adjustments during regular operation. In times of breakdowns, the operator is required to make quick responses in order to prevent costly damage or loss of production. (2) The maintenance man, a craftsman, requires a high level of traditional skills for the manipulation of physical materials with tools. He is essential for the maintenance and repair of the costly machinery of the automated process production system. (3) The semi-skilled and skilled worker in the field and drilling operation, whose work varies according to his occupation but who has to be able to cope with the stress of being away from home in a hostile northern environment and working a twelve-hour work day. (4) Finally, the clerical worker in centrally located offices of the petroleum industry. Whereas all other groups are quite physically mobile, the clerical worker is more or less confined to his desk and his skills are related to the operation of a few office machines and working with reports, figures and miscellaneous paper work.

The above four groups of employees represent the work force in the following types of technology: (1) continuous process technology, (2) craft technology, (3) drilling technology, and (4) clerical technology.

The clerical technology is not considered to be one of the modes of "technical production", but it is considered here as one section of the labour force which some trainees choose to be part of.

Continuous Process Technology. Continuous process technology is the most highly automated form of manufacturing. It is the liquid or gaseous nature of the raw material that allows full automation of the process. The flow of materials that passes through a number of reaction operations in a plant or is transported to the consumer through pipes, is regulated by automatic control devices. The technological structure separates the operator from the direct production process inasmuch as he has no direct contact with the material. The automated process regulates the quantity of output controlled either by management of a plant or from a distant city.

The separation of production from the worker as such is reconciled by the operator's definition of his job in terms of external observation of the processes with the help of instruments. This detachment from direct production is of importance for the work situation, since during the general operation, the worker's performance is not directly linked with the quantity of output (Blauner, 1967:141). His performance is related to the production process indirectly only as he has some control over the quality of output by observing, adjusting, and maintaining the instruments.

Although instrument readings and other tasks have to be performed at time intervals, the operator is able to control his work pace. The possibility of monotony and resulting boredom in this work must be considered. The hours pass slowly and reading instruments may not be rewarding for some.

Problems and breakdown within the automated process have to be anticipated, however. In times of crisis, the full labour force may be needed to solve the problem in an effort to return operations to normal as expediently as possible. These situations require immediate and accurate responses on part of the operators. The operator considers these times as a challenge and willingly works extremely hard to bring the crisis under control. Since the breakdown of the complicated automatic machinery is most frequently outside the operator's jurisdiction, he does not feel any pressure of guilt. "Therefore, instead of a steady work characteristic of other types of manufacturing, the work of the (chemical) operator has an irregular, even erratic, rhythm" (Blauner, 1967:136).

The operator requires a relatively low level of competence. The skills demanded are related to the general operation of the equipment, and during a period of smooth operation the operator performs his tasks in a routine manner. Blauner argues that the lack of societal consensus about the value of skill required is a result of the relative newness of automated plants.

> Since skill in the automated plant is new and vaguely defined and there is no societal consensus on its value, it is not surprising that the process operators themselves were ambivalent about the character of their jobs. Virtually all of the workers interviewed said that their tasks required skill, even lots of skill, yet they were unsure of what was involved (Blauner, 1967:159).

The relative newness of skills required in the continuous process technology does not seem to be the main criteria for its ambivalence, however. Supervisors who were questioned in this research have criticized the introduction of the DACUM charts on grounds that they do measure skill, but that skill without responsibility is of little use in evaluating an operator's performance. The DACUM charts clearly define skill levels for each occupation. As they primarily refer to skill, an operator can quite easily be rated accordingly - the question remains whether an operator applies these skills responsibly. Several supervisors argued that the correct use of skill alone does not produce a good operator, but rather his ability to employ and interpret these skills within the normative context. Whereas "adjusting valves" refers to turning the correct dial, therefore a simple menial task that requires a low level of skill, the recognition and internalization of the circumstances under which a valve has to be adjusted is more important. The former refers strictly to the technical aspect, whereas the latter requires the internalization of organization norms. Therefore supervisors stress not so much the simple task as such, but the responsibility to perform a simple task conscientiously.

The operator's major contribution in the production process, therefore, lies not so much in the competence with which he performs instrumental tasks, as it does in his acceptance of the institutional order of work organization. The automated mode of production assumes part of the skills of the worker and transfers the responsibility of controlling these processes to the worker by simple operations (i.e. pushing buttons, etc.). As the process is continuous, the simple tasks performed by the personnel are distinctly interlinked through the authority and responsibility patterns of the technical process. Communication between different personnel is continuous and elaborate. Responsibility, rather than skill becomes the major issue of continuous process technology.

> In automated production, when workers' function becomes responsibility rather than skill, consultation with supervisors, engineers, chemists, and other technical specialists becomes a regular, natural part of the job duties (Blauner, 1967:147).

An elaborate system of superior and subordinate ranks is part of the formal structure. Among operators, there are usually four classifications that refer to specific offices that define the privileges, loyalties, authority and responsibility. As most of the coordinating and administrative functions fall to the head shift operator or sub-foreman - usually the most experienced man in the particular department - his guidance is not felt to be oppressive supervision. His authority is based on experience derived on the job rather than externally superimposed. Supervision is detached and indirect, a result of the geographical layout of the plant and the technical process. For these reasons the automated process requires responsible operators who do not need to be watched closely (Blauner, 1967:147).

Operators in the petroleum industry see themselves as privileged workers because the industry provides relatively high wages, internal promotion, and employment security to its work force. In response to these working conditions, but also in part because of the type of technology, the operator usually develops loyalties towards the organization.

> Not only does the responsibility demanded of the operator necessitate more loyalty to the enterprise than when work is standardized, but the constant technological change inherent in continuous-process production also makes an integrated work force essential (Blauner, 1967:153).

The high level of loyalty and company identification in the chemical industry is confirmed by various survey findings (Blauner, 1967:154). It is, among operators, based more on organizational rather than on occupational commitment, a result of the automated work process, the on-the-job training, the internal promotion system, and the relative difficulty to transfer these skills to other industries.

The continuous process technology is conducive for the integration of the work group. The small number of employees at a plant or compressor station compared with other technologies (except craft technology), encourages frequent interaction among operators. The intervals between instrument readings are long enough to provide ample time to engage in discussions and activities that are not related to the job, cutting across occupation authority lines. The lack of pressure to perform according to a fixed time schedule and the time available for leisure activity at work make informal interaction easily possible and encourage the development of interest groups. The free association among co-workers is encouraged by management to a certain extent as it ensures the successful operation of the plant or station because of the interdependence of the work group.

Craft Technology. Within the petroleum industry there exists an increasing need for skilled craftsmen who maintain and repair the expensive automatic machinery: controls technicians, instrument and heavy duty mechanics, electricians, millwrights, pipe-fitter welders, and others. Although the training of these workers differs according to their specific trade, they are all journeymen workers with special skills acquired through an apprenticeship program. The length of their apprenticeship varies between three and five years and includes formal courses at publicly recognized institutions. The apprenticeship program, with training in government trade schools, is supplemented by on-the-job experience within the petroleum industry. As a result, this type of blue-collar worker differs greatly from the operator within the same organization.

Craft technology is characterized by its high degree of control over the technical environment. "In fact, craft skill can even be defined as direct control over the technological environment by means of the manipulation of tools and materials" (Blauner, 1967:42). Craftsmen can control the pace of their own work because their tasks are not part of a mechanized or automated process. Even emergency repairs cannot be performed in undue haste as special pains must be taken to correct the problem in order to avoid further breakdown.

The skill required by a craftsman is more important than that demanded of the operator insofar as he needs a high degree of manual dexterity and commitment for the successful execution of the tasks. Clearly, this kind of work cannot be carried out under pressure. Hence, the craftsman is in a position to vary the speed of work and the sequence of operation. He is also at liberty to choose which tools to employ for a specific task and has the freedom to determine the technique of his work (Blauner, 1967:43). Frequently, however, craftsmen form work teams of twos or threes to repair equipment. Team work makes them depend upon each other's skill and cooperation between them is an important aspect of their competence.

As the craftsman has direct control over the technological environment in his application of competence, this control is reinforced and strengthened by the institutional system of the trade and the petroleum industry. It is by virtue of the apprenticeship that the craftsman can be assigned a complicated task without close supervision.

Apprenticeship is more than the imparting of skills. It is a process whereby values of craftsmanship are internalized. It gives the craftsman the authority to make use of his competence and, at the same time, he acquires responsibility for his independent work, which minimizes external control (Blauner, 1967:43). As promotions within the industry are internal, the craftsman fits into an authority structure whose most experienced and older workers are in supervisory positions; the latter assigning work and serving primarily in an advisory capacity to subordinates.

Apprenticeship, according to Blauner, produces loyalty of the skilled worker that is directed towards the craft, rather than to the employer.

> The commitment of printers and other craftsmen to their roles as producers is based more on the internalization of professional standards of the craft, such as norms of a fair day's work and quality of workmanship than an acceptance of the goals of the employer and the work organization (Blauner, 1967:47).

According to Blauner, then, craft commitment and loyalty make it easier to change companies, and the nature of the trade allows alternative employment in different industries. But the institutional structure of the petroleum industry and the specific knowledge acquired on the job may foster company loyalty as well. Although the craftsman in the petroleum industry has more options of employment outside the industry than the operator has, his work situation is quite similar to that of the operator, as compared to the craftsman in other industries and small businesses.

To the craftsman, his competence and his normative orientation to the trade and/or company are closely related in his daily work experience.

The recruitment and promotional system of the craftsman in the petroleum industry differs somewhat from that of the operator. Depending on the trade, the craftsman has two avenues open to him. He is either hired as a journeyman, or he advances from the internal rank and file of operators to the occupation of controls technician by receiving on-the-job training, supplemented with formal apprenticeship courses. In either case, however, internal promotion depends upon the experience within the petroleum industry because of the specialized and complicated machinery. This recruitment and promotional procedure reduces much friction within the craft technology because superiors are usually men who know the operation best and are from rank and file (Blauner, 1967:43). It does, however, create some antagonism, as operators tend to see their job as carrying less prestige than that of the craftsmen. Operators are quite defensive and concerned about their relative position (Blauner, 1967:161). This is not surprising as the operator's wage scale is below that of the craftsman, and many craftsmen in the petroleum industry have been internally promoted from the operator's rank and file.

Drilling Technology. The geographical and climatic conditions of the Arctic, the camp life, and the technology employed foster a distinct work orientation among employees working under these conditions.

Oil exploration in the Arctic is carried out by two major groups of workers: those employed on the drilling rigs and those employed in base camps. The former are, with a few exceptions, employed by drilling sub-contractors, whereas the latter are directly employed by the oil companies which organize the drilling operations.

Occupations on the drilling rig made available to interested northerners are roustabout, roughneck, motorman, derrickman, and driller. Each occupation, in that order, is a springboard for the next in the promotional system of drilling operations. Among other occupations available to the northern trainee are heavy equipment operator, material supervisor, and clerk expeditor.

These occupations require different levels of competence and responsibility. They require a certain amount of skill, though the task is repetitive. As drilling operations are very costly, during "tripping" the exchange of pipes must be achieved as quickly as possible so that drilling can continue.[1] Under these conditions, the worker is under high group pressure to perform. The rhythm of work requires a high degree of cooperation of each worker with the other team members to assure safety and continuous work flow. Therefore, the tasks of the drilling technology differ from the continuous process and craft technologies as group members as a team have control over the production process. They require more skill than the operators but less than the craftsmen; in addition, the task involves heavy, dirty, repetitive manual labour.

The supervision of the worker varies according to the specific tasks he performs. When working in a team, supervision of the worker is possible on the immediate level and is continuous. At other times, the physical mobility of the worker who performs different tasks makes direct supervision more difficult. These tasks are divided among the drilling crew. They involve the servicing and maintaining of the mud pumping system, rig motors, steam boilers, rotary equipment and drilling equipment. When a drilling rig is dismantled at one location and reassembled at a different site, the drilling crew has to do this work as well. The authority given and the responsibility one worker has to assume under different conditions, varies from one situation to another. In the case where direct supervision is impossible, internalization of responsibility is essential. On the drilling floor, authority and responsibility are less of an issue as they become an integral part of the competence of the worker. Even the supervisor performs two roles: he is responsible for the drilling, but at the same time is part of the drilling team, i.e. he does not only supervise, but is working with the team and performing a task. Supervision in those instances is not felt by the team members as that of the institutional order, but rather as part of the team's performance.

---

[1] "Tripping" refers to the procedure when it is necessary to check or exchange a drill bit whereby all pipes used in drilling have to be pulled out, disconnected and stacked.

Although internal promotion produces loyalty to the company on the supervisory level, studies show that in the lower positions (roustabout and roughneck) company loyalty is not present - as termination rates indicate (Hobart, 1974:38). This lack of loyalty may be a reflection of the extreme working conditions the worker is exposed to in the Arctic.

Although drilling technology requires a high degree of team effort (i.e. cooperation), the noisy machinery is not necessarily conducive to develop integration among work associates. Long working hours do not permit leisure activities to any large extent, even though workers share camp life.

Clerical Technology. The petroleum industry requires a relatively large office work force to organize labour in the field, the gas and oil plants, the compressor stations, and for marketing the product. Most of the personnel are stationed in centrally located offices in larger cities.

Among clerical workers manual marketable skills vary, but they make common use of office equipment for productive purposes. It is difficult to separate the competence of the clerical worker, as most offices require the worker to adhere to company rules and precedents. The typist, for example, relies mostly on the dexterity of her hands, with little responsibility. The cost analyst, for the performance of his/her job, depends less on the manual skill of using a calculator, but rather on the grasp he/she has of the specific task to be executed. The occupation of secretary falls between the two examples, requiring a high degree of manual skill for handling office equipment, as well as the ability to exercise authority and responsibility. Competence, then, can be separated in one occupation but not as clearly in other occupations within the clerical technology. Not only does this distinction vary, but so does the level of competence and responsibility, and in turn the degree of authority attached to a particular job.

Because of the relatively prosperous economic situation the petroleum industry finds itself in, it can provide security to its work force, plus pay higher wages than most other industries. In turn, it receives loyalty to the organization from its clerical employees. As the clerical worker, especially on the lower echelons, can find employment in any other office setting, loyalty is not a reflection of the type of technology. It is directly associated with the company's reward to its employees of special privileges.

Clerical workers are confined to the office setting, and their work does encourage integration.

It is postulated that the clerical technology is farthest removed from the other previously discussed technologies. It exhibits particulars that cannot be easily compared with these other technologies, such as being confined to a desk in a large office, and not encountering crisis situations.

Summary. In this section, the theory of the socio-technical system was introduced and its major principle applied to the petroleum industry. It is postulated that within that industry different types of technology partially produce different orientations on part of the workers towards their work, the employing company, and their work associates.

Four types of technology have been distinguished: continuous process, craft, drilling, and clerical. The latter is considered as being farthest removed from the former three, in that its workers are placed in an office situation, which defines them as one segment of what has been called white-collar workers.

THE THEORY OF EVALUATIVE ORIENTATION

Talcott Parsons' theory of action deals conceptually with three aspects of structuring a completely concrete system of action: the cultural system, the personality system, and the social system. The cultural system refers to signs and symbols that acquire common meaning and serve as media of communication between actors (Parsons, 1964:5). The personality system refers to that part of the action system whereby genetically given need-components interact with social experience (Parsons, 1964:9). The social system

> . . . consists in a plurality of individual actors interacting with each other in a situation which has at least a physical or environmental aspect, actors who are motivated in terms of a tendency to the 'optimization of gratification' and whose relation to their situation, including each other, is defined and mediated in terms of a system of culturally structured shared symbols (Parsons, 1964:5-6).

The concept of social system of action has as a frame of reference the actor's orientation to a situation. The situation, however, is subjectively defined by an actor as consisting of objects of orientation which can be conveniently classified into three modes: cognitive, cathectic, and evaluative modes of orientation. The term "evaluative" is given by Parsons to the process of selection among alternatives in the cognitive mapping of objects as to what they are or mean to the actor (Parsons, 1964:7).

> The orientation of one actor to the contingent action of another inherently involves evaluative orientation, because the element of contingency implies relevance of a system of alternatives (Parsons, 1964:37).

As an actor can be conceived of as a social object to which another actor responds, interaction can be formulated as double contingency, whereby both actors' evaluative orientations enter in the process.

Richard Jung (1965) follows the tradition of Parsons but deviates in some fundamental respects. On the one hand, he accepts the theory of orientation as embedded in a general theory of action as does Parsons, but he clearly separates it from the motivational and decision aspects. Where for Parsons (1964:4) motivation enters the theory of action only insofar as the actor's relation to the situation is motivationally relevant, thereby combining motivation with orientation, Jung assigns motivation a special status. Furthermore, he separates the process of decision making that can be found implicit in Parsons' work.

According to Jung,

> . . . the general theory of action is envisaged as emerging through the integration of three special theories: (1) an orientation theory, (2) a decision theory, and (3) a motivation theory. Each special theory would be concerned with a different (special) fundamental problem in the explanation of action, employ different dependent variables, and invoke a different special extremum principle to explain a different part of the total variation in action (Jung, 1965:70).

Within the theory of orientation, Jung postulates 12 classes of statements. "Each of the twelve classes of statements is a system of statements, and has been labeled a system of discourse" (Jung, 1965:74). The cross-partition of systems of discourse into four equivalence classes (each of which contains three systems of discourse), produces "the distinction between espistemic and telic systems on the one hand, and between simple and combined systems on the other hand" (Jung, 1965: 74-75). The telic systems differ from the epistemic systems in the way that

> . . . only in telic discourse a definition of an actor is given, and the meaning of all statements depends on (a) their relevance to

> that definition (situation or residual environment) and (b) their compatibility with that definition (eu- or dysfunctional) (Jung, 1965:75).
>
> The theory of orientation, as a special theory, subsumes most of the phenomena traditionally discussed as perception, cognition and thinking as instances of epistemic orientation. It would also subsume many aspects of emotion (but not motivation), and nearly all prudential, moral, ethical, normative and other forms of valuation (but not decision) as instances of telic orientation (Jung, 1965:72).

Jung's theory advances beyond Parsons' conceptualization of the action system relevant for this study in at least two ways: First, it permits concentration on the telic orientation of an actor without the necessity of explaining motivational and decision processes. As the investigation of this dissertation is limited to the evaluative aspects of orientation of northern trainees and their work associates to each other, motivational and decision processes become secondary.

Second, Jung's theory advances beyond the conceptualization of orientation, by postulating an explanatory principle governing the process of orientation, the principle of reduction of uncertainty. According to that principle, an actor will accept from all available statements such definition of an action world that has minimum possible uncertainty.

> The principle of reduction of uncertainty leads to the postulation of gradients of uncertainty, associated with each system (Jung, 1965:81).
>
> Uncertainty is at a relative maximum when it is not possible to determine whether a given state of the organism is within or outside the focal region (its definition as the actor). Evidence of compliance (+) or violation (-) of the definition of the actor reduces uncertainty equally towards a relative minimum (Jung, 1965:82).

In order to elaborate on the principle of reduction of uncertainty, it is necessary to use terminology employed and elaborated later in this chapter. An actor, in defining his situation within the expressive system, will be at a maximum of uncertainty when he is unable to define his relation to the work group. He will define the situation as isolation (maximum uncertainty) when the work group does not provide occasions for informal contact, shows total indifference towards him, does not share symbolic meanings, and when he considers himself as an outsider (not representative of the group). The principle of reduction of uncertainty will induce the actor to seek a definition of the situation by accepting statements that minimize this uncertainty. By doing so, he creates and reinterprets his social reality for it to become more comprehensible to him. In doing so, he shifts away from maximum uncertainty and minimizes it as much as possible.

By contrast, a given actor may define his situation within the expressive system of orientation as integrative (minimum uncertainty). He accepts available statements of the action world that define him as part of the work group, irrespective of whether he is well liked or hated. In either case, the actor is aware that the work group provides occasions for informal interaction; he feels that he comprehends its symbolic expression, that it is receptive and that he is part of the group (representative).

It is obvious that for a concrete actor both polar types are unrealistic in a relatively stable social system, but rather, that he finds himself at some point on the gradient of uncertainty. An actor, then, accepts available statements of his definition of the situation as more or less uncertain, and different concrete actors will find themselves at different locations on the gradient of uncertainty. Jung's principle of reduction of uncertainty, then, explains part of the actor's evaluative orientation as it assumes that all actors attempt to reduce uncertainty, though thus succeed in doing so to varying degrees.

Parsons' and Jung's theories are firmly embedded in the sociological tradition that regard an actor as not responding to the total environment, but to some selected part of it; the actor takes an active part in constructing his action world. Orientation, as a process, is a specific aspect of the action world, by which the actor transforms his experience into the definition of the action world (Jung, 1965:72). Parsons' "evaluative orientation" as a process of selection among alternatives in the cognitive mapping of objects as to what they are or mean to the actor (Parsons, 1964:7) is similar to the more precise formulation of Jung's telic orientation involving "a subjectifying transformation of an already constructed epistemic system" (Jung, 1965:78). The term "evaluative orientation" will therefore be applied in this dissertation.

In the next section I shall briefly discuss Jung's six systems of telic orientation and establish some similarities with Parsons' evaluative orientation.

Jung's Six Systems of Telic Orientation

Within the telic orientation, Jung formulates three simple systems: aesthetic, moral, and religious. These are combined by specific rules or operations into three combined systems: pragmatic, ethical, and expressive (Jung, 1965:91). Since combined systems are based on the simple systems, it is necessary to briefly describe the simple systems, although the major interest of this dissertation is in the combined systems.

The Aesthetic System. In this system the actor defines his situation as a consumer. His relations to his situation are his emotions. These serve as criteria for defining situations as irritable or emotionally clear (uncertainty polar types: irritation-emotional clarity) (Jung, 1965:93).

In Parsonian terms, ego relates to the object in question for gratification (Parsons, 1964:7). In my opinion, therefore, the aesthetic system corresponds with Parsons' "need-disposition" system of the gratification-deprivation dimension.

The Moral System. In the moral system the actor is defined as a role. Role is a set of expectations (standards) that serve the actor to evaluate objects. An actor assumes different roles and evaluates them as functionally significant or functionally insignificant, and makes his role commitments accordingly (uncertainty polar types: functional insignificance - functional significance) (Jung, 1965:93).

In Parsons' theory, the commitment (or lack of it) to a role by the actor will affect his conformity or deviation to expectations (Parsons, 1964:50). Conformity, then, is strictly a moral issue that may suffice as a principle of guidance within a simple interaction context. As both Jung and Parsons stress that role and the actor's commitment to a role affect conformity, part of Jung's moral system corresponds with Parsons' conformity-deviation dimension.

The Religious System. Jung's religious system defines for the actor his situation in terms of his ultimate concerns and rules of importance. These serve as criteria for defining situations as meaninful or absurd (uncertainty polar types: absurdity-meaning) (Jung, 1965:93).

The same fundamental idea is expressed by Parsons when he defines a value as "an element of a shared symbolic system which serves as a criterion for selection among alternatives of orientations which are intrinsically open in a situation" (Parsons, 1964:12). Therefore, I consider Jung's religious system similar to Parsons' value-orientation.

The Pragmatic System. The pragmatic system of orientation is a combination of the aesthetic and moral system (Jung, 1965:91). The actor defines his situation as a producer. The system defines for the actor his situation in terms of his constraints and prudential rules (Jung, 1965:91). These rules serve as criteria for defining situations as impotent or competent (uncertainty polar types: impotence-competence) (Jung, 1965:93).[2]

Jung's pragmatic system corresponds closely with Parsons' cathectic orientation. The cathectic orientation combines the gratification-deprivation dimension with the conformity-deviation dimension. Parsons elaborates as follows:

> One central aspect of the general and especially the cathectic orientation of the actor is his set of need-dispositions towards the fulfillment of role expectations,in their first place those of significant actors but also his own (Parsons, 1964:32).

---

[2] Fowler emphasizes that competence is clearly distinguishable from performance. He follows loosely Jung's action theory, without referring to it, when he presents the argument that performance of any task is the moment when competencies become manifest in combination with the actor's motivational and decision processes. For instance, an actor may not optimize his competence in performance because he may have a different set of expectations than alter (i.e. institutionalization); or any number or motivational aspects may produce variations in competence-performance ratios such as fatigue; or, the lack of decision processes in certain situations may produce variation in performances (Fowler,1972:93).

It is in the pragmatic system that Parsons' instrumental complex will be located in the next section.

The Ethical System. The ethical system combines the moral with the religious system (Jung, 1965:91). In this system the actor defines his situation as an office. Combining standards and values, the system also defines for him his situation in terms of his norms and categorical rules. These serve as criteria for defining situations as normative or anomic (uncertainty polar types: anomie - normative determination) (Jung, 1965:93).

To Parsons, "it is inherent in an action system that action is, to use one phrase, 'normatively oriented'" (Parsons, 1964:36). Parsons' normative orientation of action is defined in similar terms as Jung's, but emphasizes the problem of order for the most elementary communication essential for interaction. It is defined "as the mutuality of expectations oriented to the shared order of symbolic meanings" (Parsons, 1964:11).

For both Parsons and Jung symbolization and conformity are clearly involved in orientation as a part of social action and an individual actor can acquire these only through interaction with social objects. Therefore the ethical system (Jung) and the normative orientation (Parsons) of an actor are acquired within an institutional complex. Where for Parsons interaction requires mutuality of expectations and a shared order of symbolic meanings, for Jung mutuality and shared order are criteria open for empirical investigation.

An ethical complex of orientation has not been formulated by Parsons. It will be the task to do so in the next section.

The Expressive System. The expressive system combines the aesthetic with the religious system (Jung, 1965:91). The expressive system defines for the actor his situation in terms of his status and the associated rituals. An actor assumes different statuses by combining his definition of the situation as a consumer with his ultimate concerns (Jung, 1965:91). His relations to his situation are defined by rituals, which are combination statements of the actor's emotions and rules of importance (Jung, 1965:91). These serve as criteria for defining situations as integrative or isolative (uncertainty polar types: isolation-integration) (Jung, 1965:93).

A similar parallel is found in Parsons' system of orientation: combining the gratification-deprivation dimension with the value-orientation. The actor organizes a set of need-dispositions in an attachment to alter, and integrates it with a system of commonly shared symbols (Parsons, 1964:77).

Parsons' expressive complex will be located in Jung's expressive system of orientation.

Summary. In this section Jung's six systems of telic orientation were briefly discussed and comparisons with some aspects of Parsons' evaluative orientation were made. Jung's theory of telic orientation brings clarity to some of Parsons' interpretations by specifying the components and their relations more explicitly. In addition, it introduces gradients of uncertainty, associated with each system as an explanatory principle governing the process of orientation.

In the next section Parsons' instrumental and expressive complexes are presented and an ethical complex is introduced. I shall then locate the complexes of orientation within Jung's combined systems and establish the relation between these complexes and Jung's uncertainty principle.

Social Exchange: the Instrumental, the Expressive, and the Ethical Complexes

In his book The Social System, Parsons distinguishes three types of action-orientation: The instrumental, the expressive, and the moral (Parsons, 1964:69). Starting from classical economic theory of exchange, Parsons applies his ideas of instrumental and expressive orientation to the relational context of the goal or gratification oriented actor, and formulates an instrumental and an expressive complex, but fails to do so for moral orientation. Within each complex, the actor "is confronted with four major types of problems of the ordering of his relation to significant alter" (Parsons, 1964:72).

According to Parsons, the actor within a social exchange system is confronted with two major issues in relation to alter. First, the regulation of the settlement of terms of exchange is a

> mechanism through which the terms on which ego will or will not make his services available to alter are settled in such a way as to be compatible with the conditions of stability of the system (Parsons, 1964:71).

The second major issue deals with the regulation of the settlement of terms of exchange in which an object or property of object changes hand (Parsons, 1964:71).

Parsons differentiates further these two issues by two aspects, resulting in four major types of problems of the ordering of the actor's relation to significant alter in his instrumentally and expressively oriented activity.

The Instrumental Complex. Within the instrumental complex of action-orientation the actor considers alter to be a means towards the exchange of some objects or property of an object. The actor is confronted with four major types of problems: facilities, cooperation, disposal, and remuneration (Parsons, 1964:73).

The regulation of rights to facilities or access to them is one functional problem foci of a relational system of instrumental orientation (Parsons, 1964:72).

> Facilities, i.e. materials, equipment, premises and the like are possessions in a special mode of significance to action; they are possessions devoted to the 'production' of further 'utilities', that is destined to be used as means to some further goal rather than as objects of immediate gratification (Parsons, 1964:72).

"Facilities", in the above sense, refers to objects that are external to the actor. For its internal counterpart, I shall use "facility". Facility of an actor is lexically defined as the quality that promotes the ease of action, operation or course of conduct. The regulation of rights to a facility of alter or access to it by the actor is important within the interaction context. I shall therefore extend the meaning of the first aspect of the regulation of the settlement of the terms of exchange by including the notion of facility.

Facility(-ties) are possessions that are defined as a means to some further end and are provided by alter. They are not marketable as such.

The second major type of problem within the regulation of the settlement of the terms of exchange an actor is confronted with is cooperation.

> Cooperation is a closer mode of the integration of instrumental activities than exchange. It means the meshing of activities or 'contributions' in such way that the outcome is a unit which as a unit can enter into the exchange process (Parsons, 1964:72).

In general, I accept this concept with one reservation. Parsons mentions that cooperation "may include assumption of authority over some others and/or acceptance of subjection to the authority of others" (Parsons, 1964:73). This statement is a result of Parsons' inability to clearly separate moral from ethical issues. In Jung's system theory of telic orientation, the actor is confronted in the instrumental complex only with aesthetic and moral issues. Cooperation, as part of this complex, I interpret as the mapping of gratification-deprivation dimension into the conformity-deviation dimension. Analytically, then, cooperation never includes assumptions of authority. Authority, however, will be formulated as a major type of problem of the ethical complex, in which the value-orientation is combined with the conformity-deviation dimension.

Cooperation, then, is considered as one essential aspect of the instrumentally oriented exchange system in which alter is considered a means towards an end.

The third major type of problem of the instrumental complex is called "disposal" (Parsons, 1964:70). It is one aspect of the settlement of terms of exchange whereby the actor disposes of something. "The regulation of structuring of the 'outflow' process may be called that of 'disposal' of the produce of the actor's efforts to alter" (Parsons, 1964:70). Disposal refers to the process whereby the actor makes his services available to alter.

The fourth major type of problem an actor is confronted with in the instrumental complex Parsons calls remuneration (Parsons, 1964:70). It refers to the regulation of the settlement of the terms of exchange on which the actor receives contributions to his own goals from alter.

As remuneration is lexically defined as paying an equivalent for a service, loss, or expense, I shall extend the meaning of this type of problem by introducing the term "sanctions". The interpretation of sanctions follows Parsons' exposition of the term.

> The structuring of the reactions of alter to ego's action as sanctions is a function of his conformity with the standard. Therefore, conformity as a direct mode of the fulfillment of his own need-dispositions tend to coincide as a condition of eliciting the favourable and avoiding the unfavourable reactions of others (Parsons, 1964:38).

Within an actor's instrumental orientation, sanctions "may be subdivided into positive and negative according to whether they are felt by ego to be gratification-promoting or depriving (Parsons, 1964:38).

The key issue in the above quotation of Parsons is the interpretation of sanctions as a combination of the conformity-deviation dimension with the gratification-deprivation dimension. The similarity in Jung's pragmatic system must be emphasized: The interpretation as sanctions is defined as the mapping of the moral system into the aesthetic system (Jung, 1965:91).

The use of the concept sanctions as the fourth type of problem includes the notions of rewards (remuneration is one of them), punishment and withdrawal of rewards. It permits analysis of interaction contexts in which the actor enters terms of exchange that are morally acceptable to the actor, but depriving - certainly not a situation of equivalent payment. The actor engages in this instance in interaction to avoid negative sanctions. Therefore I consider remuneration as too restrictive.

The instrumental complex defines the actor's and alter's rights in possessions. What is one actor's disposal is alter's sanctions and vice versa. The actor considers alter as a means towards the exchange of some object or property of object.

The Expressive Complex. Within the expressive complex of action orientation the actor considers alter as an end or the object in focus. In turn, the actor himself must be willing to serve as an object (Parsons, 1964:75). In the expressive complex, the actor is confronted with four major types of problems that are homologous to the instrumental types of problem: occasions, expressive loyalty, receptiveness, and response (Parsons, 1964:74).

Occasions, homologous to facility, provide an appropriate context for the expressive activity as the regulation of the settlement of terms of exchange.

> This includes such matters as the appropriateness of time and place for expressive activity, the significance of surrounding physical objects, including the embodiments of cultural symbolism, e.g. works of art, the presence and role of third parties and the relation to collectivities as social objects (Parsons, 1964:76).

Whereas the same concrete object of the situation may function both as object of instrumental and expressive orientation, the focal objects of expressive orientation are symbolically integrated with alter, whereas the focal objects of instrumental orientation are integrated with the object to be produced (Parsons, 1964:76).

Parsons calls the second type of problem "expressive loyalty" (Parsons, 1964:77). It will become clear in the following discussion that I agree with the interpretation of Parsons' second problem, but disagree with using the term "expressive loyalty".

To Parsons, the first aspect of loyalty refers to the situation whereby alter is considered by the actor as an object of attachment of an organized system of gratification (Parsons, 1964:77).

> The second aspect of loyalty derives from the fact that the attachment is organized in terms of a cultural pattern which, in the first instance, will be a pattern of expressive symbols, the meanings of which are shared between ego and alter (Parsons, 1964:77).

> A relationship of expressive loyalty then organizes a set of need-dispositions in an attachment to the particular object and integrates it with a system of commonly shared expressive symbols which are appropriate to the cathectic interests in question (Parsons, 1964:77).

Again, Parsons discusses social action within a stable system, therefore making reference to mutuality and sharing. However, the expressive symbols, being aspects of the actor's cultural pattern, need not be shared with alter.

The combination of Parsons' need-disposition dimension with the value-orientation (i.e. expressive symbols), I perceive as similar to Jung's combination statements of the expressive system. Expressive loyalty I consider a misnomer. Loyalty is derived from the latin word "legalis". "Legalis" is lexically defined as "faithful in allegiance to one's lawful sovereign or government, or faithful to a private person, a cause, ideal or custom" (Webster, 1975:683). The above definition implies normative (legal) aspects that are produced by combining the conformity with the value dimension - being void of need-dispositions. I shall therefore follow Jung's interpretation of loyalty and will make use of it in the ethical complex. I shall replace "expressive loyalty" with "symbolization", a term used by Jung for the correspondence rule that combines the aesthetic with the religious system (Jung, 1965:91). This interpretation is consistent with Parsons' statement of combining the need-disposition dimension with the value-orientation dimension.

"Receptiveness" is the term used by Parsons for the third type of problem. The objects of exchange are the actors themselves.

> Here ego has a problem homologous with that of disposal, namely, that of ensuring alter's 'acceptance' of his orientation, of his willingness to serve as an object of the relevant type of expressive interest on ego's part. This may be called the problem of alter's 'receptiveness' to ego's orientation (Parsons, 1964:75).

Finally, the fourth type of problem an actor is confronted with is referred to by Parsons as the "response" the actor receives from alter. Response "would seem to be homologous with the remuneration aspect of an instrumental system" (Parsons, 1964:75). I find the term too general, as it fails to signify the specific aspects of the expressive complex. The term "expressive response" is more accurate, but still does not capture the range of the domain Parsons attempts to describe. "Representation" is a better term. Lexically defined, "to represent" refers to the use of a symbol as an object (e.g. a flag represents a country). Within the social exchange system, the expressive complex poses the problem to the actor of what alter "represents" to him. Representation then refers to the actor's acceptance of alter's orientation, of alter's willingness to serve as an object. What is one actor's receptiveness is alter's representation and vice versa. Jung makes use of the term "representation" in his telic system of orientation as the mapping of the religious system into the aesthetic system (Jung, 1965:91).

The expressive complex defines for the actor the rights in relational possessions. Therefore, both actors must be willing to serve as objects for each other.

The Ethical Complex. Parsons fails to develop a complex for his moral action orientation. It is therefore necessary to employ the same principle of social exchange to formulate four types of problems of what I call the ethical complex. Its name has been derived from Jung's ethical system as it will be located within that system.

Within the ethical complex of action orientation, the actor is confronted with the two major issues in relation to alter as presented by Parsons: the regulation of the settlement of terms of exchange as a mechanism and the regulation of the settlement of terms of exchange of objects or property of objects. Following Parsons, these two issues are further differentiated, resulting in four major types of problems of the ordering of the actor's relation to significant alter in his ethically oriented activity. The four major types of problems are: privilege, loyalty(-ties), authority, and responsibility.

The first problem an actor is confronted with, homologous to facility(-ties) and occasions in the instrumental and expressive complex respectively, is called "privilege". It refers to the right granted as peculiar benefit, especially when such a right is attached to a specific office. It provides the actor with access rights to other actors in specific offices, with objects, and third parties (collectivities), as social objects. Privilege is a possession used to a means to some further goal.

The second problem an actor is confronted with in relation to alter is referred to as "loyalty(-ties)". As discussed within the expressive complex above, loyalty(-ties) is not considered to be a problem of the expressive complex, but is homologous to symbolization of the expressive complex and to cooperation of the instrumental complex. The specific meaning of the term used in this dissertation is derived from Jung's system, i.e. the mapping of the moral system into the religious system (Jung, 1965:91).

"Authority" is the term introduced for the homologous problems of disposal and receptiveness of the instrumental and the expressive complex respectively. It refers to the transfer of a "possession". Authority, in this context, is defined as the power available to the actor that is accepted by alter as valid (alter accepts the actor's orientation). Viewing the ethical complex as one aspect of Jung's ethical system, the transfer of authority, in my opinion, arises when an actor considers the values that define the standards under which he exercises power is accepted as legitimate by alter. Parsons expresses this point in a similar way:

> Following Max Weber here we may put primary stress on the basis of the legitimacy of 'authority' to take action which is 'binding' on the collectivity as a unit and hence its members. Authority to bind and to coerce a member of the collectivity is, in this respect, of the same fundamental character as authority to assume a treaty obligation. In other words, the primary starting point for the analysis of variability lies in the nature of the value-orientation patterns which define this aspect of the role (Parsons, 1964:135-136).

The final major type of problem an actor is confronted with in the ethical complex is called "responsibility". Parsons states that the

> attachment to common values, . . . always has also a 'moral' aspect in that to some degree this conformity defines the 'responsibilities' of the actor in the wider, that is, social action system in which he participates. Obviously the specific focus of responsibility is the collectivity which is constituted by a particular value-orientation (Parsons, 1964:41-42).

The term "responsibility" is also used in Jung's system theory in a similar, but more precise way. It refers to the mapping of the moral into the religious system (Jung, 1965:91). Responsibility, then, is the homologous problem of sanctions and representation of the instrumental and the expressive complexes respectively.

The ethical complex defines for the actor the rights in relational possession. Authority and responsibility are properties of objects of exchange: what is one actor's authority is alter's responsibility and vice versa. The mechanisms of the regulation of the settlement of terms of exchange are privilege and loyalty(-ties).

Interpretation of the Problems of Social Exchange as Components of Uncertainty. Certain similarities between Parsons' social system and his instrumental and expressive complexes of action-orientation and Jung's theory of telic orientation have been emphasized. Several of Parsons' and Jung's concepts and their relations to each other are similar though different terms have been employed. It is now possible to locate Parsons' modified instrumental complex in Jung's pragmatic system, the above developed ethical complex in Jung's ethical system, and Parsons' modified expressive complex in Jung's expressive system. The utility of locating these complexes in Jung's combined telic sub-systems of orientation, however, lies in the interpretation of the four major types of problems as elements of the uncertainty principle.

Parsons develops a classificatory conceptual scheme of the terms of social exchange, but fails to treat these concepts as variable concepts. The term "problem" suggests, however, that the actor has to find a solution to these problems in a relatively stable action system. As social situations differ, a concrete actor cannot be expected to define his situation with certainty all the time. Being confronted with problems, an actor will attempt to reduce his uncertainty by finding solutions to these problems. Therefore, the confronted problems are variable rather than classificatory issues to the actor. This variability of the major types of problems is essential for a theory of orientation, if this theory is expected to have any explanatory power. A concrete actor, then, finds himself at different locations on the gradient of each respective problem, or variable concept.

Going beyond the conceptual relations between the problems of the instrumental, ethical, and expressive complex, these types of problems are considered as components of constructs within these complexes that account for the variability of the definition of the situation for a concrete actor. Henceforth, I shall refer to all "types of problems" as "component concepts".

To explain the location of a given actor on these component concepts (and therefore, on their respective constructs), I apply Jung's explanatory principle of uncertainty to the instrumental, ethical, and expressive complex of action-orientation. As the relations between all component concepts have been conceptually specified, the relevant component concepts for each complex are essential in order to place the actor on the gradient of uncertainty in that particular complex. If the actor is not within or outside the focal region on all four component concepts, the actor is at a relative maximum of uncertainty in that particular complex. More typical, a concrete actor will find himself within these limits of these polar types on the gradient of uncertainty.

The instrumental, ethical, and expressive complexes are governed by different gradients of uncertainty, each explaining one aspect of the actor's evaluative orientation. The component concepts of the instrumental complex (within the pragmatic system) make up the construct competence. The component concepts of the ethical complex (within the ethical system) constitute the construct normativeness. And the component concepts of the expressive complex (within the expressive system) comprise the construct integration.

The constructs governing the gradients of uncertainty and the respective component concepts employed in this dissertation are contrasted below with Parsons' complexes of evaluative action-orientation and their respective major types of problems.

Uncertainty Gradients		Parsons' Classificatory Scheme	
Construct	Component Concept	Complex	Type of Problem
Competence		Instrumental	
	Facility(-ties)		Facilities
	Cooperation		Cooperation
	Disposal		Disposal
	Sanctions		Remuneration
Normativeness			
	Privilege		
	Loyalty(-ties)		
	Authority		
	Responsibility		
Integration		Expressive	
	Occasions		Occasions
	Symbolization		Expressive Loyalty
	Receptiveness		Receptiveness
	Representation		Response

THE THEORY OF EVALUATIVE ORIENTATION AND THE SOCIO-TECHNICAL SYSTEM

The pragmatic, ethical, and expressive systems and their respective gradients of uncertainty are now combined with the socio-technical systems theory and specific propositions about the phenomenon under investigation are formulated.

Within the frame of reference of this dissertation the trainee, his co-worker and his supervisor are workers in the industrial setting differentiated by the formal organizational structure. The trainee's evaluative orientation is directed towards the employer's competence, the supervisor's normativeness, and the co-worker's integration. The trainee's work associates' (co-workers and supervisor) evaluative orientation is directed towards the trainee's competence, normativeness, and integration. The relevant questions pertaining to the component concepts of all three gradients of uncertainty for the trainee, the co-worker and the supervisor are presented in the next chapter.

Three sets of propositions are generated by the combined use of the theory of evaluative orientation and the socio-technical systems theory. The first set of propositions is produced by applying the theory of evaluative orientation to the industrial setting. The second set of propositions is formulated by taking the major postulate of the socio-technical systems theory and producing statements that account for variations of the formal structure of the theory of evaluative orientation. The third set of propositions deals with the variation of evaluative content by making use of principles in the literature of socio-technical systems theory and applying these to the theory of evaluative orientation.

Propositions I

The application of the theory of evaluative orientation to the industrial setting imposes a formal structure upon the worker's evaluative orientation towards his situation and alter(s) that is present in rudimentary form in the theory of the socio-technical systems. The latter theory makes reference to several terms introduced in the theory of evaluative orientation, but fails to account for a complete system of the worker's evaluative orientation. Some of these terms are defined in a similar way in both theories (i.e. producer, competence, authority, responsibility); others carry additional meanings not present in the other (i.e. cooperation, loyalty, integration). The convergence of some terms, but not of others, in the two theories point to some similarities between the two, but make it necessary to apply the specific meaning of, and the relations between the concepts of the theory of evaluative orientation to the industrial setting - thereby generating the following propositions.

Proposition I (1): Trainees employed in the petroleum industry separate the three gradients of uncertainty (competence, normativeness, integration) in evaluating alters.

Proposition I (2): Co-workers employed in the petroleum industry separate the three gradients of uncertainty (competence, normativeness, integration) in evaluating the trainees.

Proposition I (3): Supervisors employed in the petroleum industry separate the three gradients of uncertainty (competence, normativeness, integration) in evaluating the trainees.

Propositions II

Within the theory of evaluative orientation a concrete actor defines alter(s) as a producer, as an office holder, and as a status holder. Accordingly, he evaluates alter(s) on three specific gradients of uncertainty: competence, normativeness, and integration. Evaluative orientation requires cognition that becomes relevant for action. The socio-technical situation, however, varies in different industries and within some industries producing variations in the formal structure of the worker's evaluative orientation. Variation of formal structure of evaluative orientation refers to the cognitive separation or fusion of the three combined systems and their respective governing principles by concrete actors who find themselves in different socio-technical situations.

The contribution to the formulation of Propositions II of the socio-technical systems theory is its postulate that different types of technology differently affect the worker's orientation towards the work organization, his work associates, and his work. This postulate, if applied to the formal structure of evaluative orientation, does not only suggest its variation, but also hints at the direction of this variation when the same criteria that have been used in Propositions I are employed to the specific types of technology.

To reiterate the essential points, in the continuous process technology the operator has no direct control over the quantity of output, has ample time to perform relatively simple tasks, and has leisure time available during working hours. Compared to the other types of technology under consideration, competence requirements are low and are clearly separated from normativeness; the latter rating being very important. During the smooth operation of the plant or compressor station, the operator performs his task alone, though he has plenty of time to spend with his work associates. Integration, therefore, is also clearly separated from the work process. Hence, it is expected that the pragmatic, ethical, and expressive systems and their respective gradients (competence, normativeness, and integration) are clearly separated by operators in the continuous process technology.

By contrast, craft technology within the petroleum industry is characterized by its high control over the technical environment, the importance of competence and normativeness as exhibited in "craftsmanship", and the frequent work in twos and threes as a team. Though the physical environment of the craftsman is similar to that of the operator, less differentiation of the pragmatic, ethical, and expressive systems and their governing principles is expected as a result of the specific type of technology.

The drilling technology exposes the worker to quite different working conditions again. Extreme weather conditions, hard manual labour, and the demands of team work impose constraints upon the crew members. Though the occupation requires less competence and normativeness than is necessary in the craft technology, the interdependence of the crew members produces a partial fusion of the pragmatic, ethical, and expressive systems of orientation among drilling crews.

Finally, the clerical technology imposes upon the worker a work routine quite different from any of the above. Here, competence, normativeness, and integration are meshed with each other, producing even less separation among the three systems and their governing principles than is the case in the other three technologies.

The following propositions may accordingly be formulated.

Proposition II (1): Trainees employed in continuous process, craft, drilling, and clerical technology will separate the three gradients of uncertainty (competence, normativeness, integration) in evaluating alters in decreasing order.

Proposition II (2): Co-workers employed in continuous process, craft, drilling, and clerical technology will separate the three gradients of uncertainty (competence, normativeness, integration) in evaluating the trainees in decreasing order.

Proposition II (3): Supervisors employed in continuous process, craft, drilling, and clerical technology will separate the three gradients of uncertainty (competence, normativeness, integration) in evaluating the trainees in decreasing order.

Propositions III

Propositions III deal with the trainee's and his work associates' evaluative content in the three types of technology within the petroleum industry. The clerical technology is omitted in Propositions III as it presents an entirely different work setting. The trainee's evaluation is directed towards the company's competence, towards the supervisor's normativeness, and towards the co-workers' integration. The work associates' evaluation is directed towards the trainee's competence, normativeness, and integration.

The homogeneity of the trainees cannot be assumed because many of them have been socialized in a different tradition. Ethnicity of the trainee, therefore, is introduced as a control variable.

Trainee's Evaluation. The trainee evaluates the competence of his employer as a producer in terms of what it offers in return for his labour. The company provides the facilities for the trainee in the form of physical objects (gas plants, compressor stations, camps, drilling rigs, offices, tools, transportation vehicles, and office equipment), and also offers provisions of continuous flow of the work process to ensure proper training and avoid loneliness and boredom on the job. In addition, the company is expected to cooperate in the coordination of the training program. Furthermore, it provides sanctions in the form of wages and special benefits or disciplinary action to the northern trainee. The trainee's willingness to stay in the program and to put in a "good day's work" can be defined as his disposal within the pragmatic system.

The trainee evaluates his assigned supervisor's normativeness in terms of the specific office the supervisor holds in the company. On-the-job training requires access to the supervisor within the training context defined by the trainee as a privilege. It requires the supervisor's interest in the trainee and the responsibility the supervisor assumes in making the training process a success. In the same context, the trainee will evaluate his own authority by the formal relation existing between him and the supervisor in the ethical system.

Finally, the trainee will evaluate his co-workers in terms of their acceptance of him as part of the informal structure of the work group. The interest exhibited by the co-workers towards him, their friendliness or indifference, the consideration directed towards him, will determine whether or not the trainee feels integrated.

Empirical studies of modern work organizations show variations among industries representative of specific types of technology. The petroleum industry, as a contemporary example of the continuous process production technique, has ranked highest in terms of the worker's evaluation of the company (frequently referred to as extrinsic job satisfaction), in terms of the worker's evaluation of the supervisor, and the worker's integration into the work group (Blauner, 1967; Woodward, 1970; Fullan, 1970). All of the above authors make use of structural indicators in combination with evaluative statements. Size of work group is used by Woodward (1970) and Fullan (1970) as an indicator of integration. It will be used as a control variable in Propositions III.

Internal differentiation on the basis of various technologies within the petroleum industry have not been the prime focus. The following propositions are derived from the discussion on the socio-technical system that is internally differentiated by three types of technology.

> Proposition III (1a): Trainees employed in craft, continuous process, and drilling technology will evaluate the company as competent when ethnicity of the trainee and size of work group are controlled for in decreasing order.
>
> Proposition III (1b): Trainees employed in craft, continuous process, and drilling technology will evaluate the supervisor as normative when ethnicity of the trainee and size of work group are controlled for in decreasing order.
>
> Proposition III (1c): Trainees employed in craft, continuous process, and drilling technology will feel integrated when ethnicity of the trainee and size of work group are controlled for in decreasing order.

Co-Worker's Evaluation. The co-worker's evaluation is directed towards his relation with the trainee. In the pragmatic system, the trainee is defined as a producer whose competence is assessed in terms of the facility he provides (physical and psychological readiness), the cooperation he gives in the performance of a task, and the skills he acquires during on-the-job training. Usually, in the working situation, the co-worker has to compensate for the lack of skill of the trainee, and if skill is interpreted as one aspect of sanctions, the co-worker has to "chip in" (or dispose of his skill).

In the ethical system, the co-worker will evaluate the trainee as to whether or not he considers working with the trainee as a privilege, whether or not the trainee shows interest in the work and the operation, and the trainee's sense of responsibility. As the co-worker is not the trainee's formal supervisor, but frequently works with him, his authority over the trainee is indirect. Since the co-worker is not in a position to exercise his authority freely, he evaluates the trainee in terms of how well the latter abides by the company regulations.

When integration is defined as the evaluative principle of the informal work group, the co-worker will evaluate the trainee as to what status he occupies in that group. The trainee is expected to provide the occasions in terms of being accessible to informal conduct, share symbolic meanings with the group and be receptive to its members' interests. The trainee's shyness, friendliness, and consideration will enhance or impede his integration into the work group.

Differences in the co-worker's evaluation of the trainee are expected not only because of the trainee's personal attributes, but primarily as a result of the socio-technical system, as different types of technology place different constraints upon the worker. The co-worker, as a peer, is likely to evaluate the trainee as increasingly less competent and normative the higher the level of competence and normativeness within the specific technology. Craft technology requires a high degree of manual dexterity and internalized normative rules expressed in the term "craftsmanship", that is most difficult to achieve.

As the co-worker has continuous contact with the trainee in the work situation, it is expected that craft trainees will be evaluated lowest in their competence and normativeness by their co-workers. Working in twos and threes requires the co-worker to compensate for the lack of the trainee's craftsmanship.

In continuous process technology the competence level required of the operator is lower and normativeness can easily be controlled by central control boards. The job can be learned more quickly and mistakes can be checked and corrected. After an initiation period, the co-worker does not need to work closely with the trainee, as readings and adjusting valves can easily be performed by following instructions. Competence, then, can be more readily achieved in the continuous process technology than is possible in the craft technology, and normativeness is clearly separated. Co-workers will evaluate the operator trainee as more competent and normative than will their craft counterparts.

In the team work situation of the drilling technology, the trainee has little leeway as far as his competence and normativeness are concerned. The competence level of the technology is relatively low, and most often the trainee has no choice but to comply with team rules. Competence and normativeness cannot be separated in specific tasks (especially on the drilling floor) and therefore when a trainee is able to keep up with the work rhythm of the drilling crew, he is evaluated as competent and normative. There is not the question of the co-worker having to work harder on account of the trainee's lack of competence; nor can trainee's mistakes be corrected - it just slows down the entire work team. Co-workers will therefore tend to accord trainees on the drilling rig high evaluations on competence and normativeness.

The integration pattern of the trainee as evaluated by the co-worker should not differ from that of the trainee's evaluation of integration. Craft technology enhances the positive evaluation of integration because of its structural conduciveness of informal association while working side by side. In addition, the specific status of craftsmen in the petroleum industry, their common apprenticeship training should socialize them to express similar interests.

Within the continuous process technology, co-workers have the leisure time available for informal tasks, but their work takes them away from the trainees and other co-workers, and there is no need - though the opportunity exists - to work in teams and establish informal relations. Whereas the craftsman cannot avoid travelling to a work site or working with someone else, the operator chooses to partake or not to partake in informal group associations. Therefore it is expected that operator trainees are evaluated as less integrated than craftsmen.

Finally, the drilling technology is least conducive for integration. Noisy machinery, hard work, and long working hours do not foster integration. In addition, during time off at camp the trainee can retreat to his room or engage in non-integrative activities, like watching television. Therefore, trainees in the drilling technology are expected to be the least integrated according to co-workers' evaluation.

The following propositions are formulated, based on the above discussion. Again, ethnicity of the trainee and size of work group are introduced as control variables.

Proposition III (2a): Co-workers employed in craft, continuous process, and drilling technology will evaluate the trainee as competent when ethnicity of the trainee and size of work group are controlled for in increasing order.

Proposition III (2b): Co-workers employed in craft, continuous process, and drilling technology will evaluate the trainee as normative when ethnicity of the trainee and size of work group are controlled for in increasing order.

Proposition III (2c): Co-workers employed in craft, continuous process, and drilling technology will evaluate the trainee as integrated when ethnicity of the trainee and size of work group are controlled for in decreasing order.

Supervisor's Evaluation. The training program enforces different constraints on the supervisor than it does on the co-worker. The different types of technology either bring the supervisor in daily continuous contact with the trainee, or separate him from the trainee in the actual work situation. The supervisor's evaluation of the trainee is therefore based on primary, as well as second-hand information. The latter occurs especially when the co-worker takes the responsibility for the trainee's every day on-the-job training. The evaluation criteria used by the supervisor will be similar to that of the co-worker, though his evaluation of the trainee will differ according to type of technology.

The supervisor is most removed from the trainee in the craft technology, as he assigns tasks to teams of which the trainee is a member. Frequently, he may communicate by telephone or radio contact with his subordinates. His reliance on the work associates for the training of northerners relieves him somewhat from that responsibility. The performance of tasks in the absence of the supervisor, the second-hand information about the trainee's competence and normativeness, should result in the trainees being given the highest evaluation in terms of competence and normativeness in the craft technology as compared to the other types of technology.

Continuous process technology enables the supervisor to have more face-to-face contact with the trainee. As plant or compressor station is the place of work for both, the supervisor is more in a position to involve himself in the training process. The supervisor's evaluation of the trainee's competence and normativeness is primarily based on first-hand information or frequent consultation with the work associates. This type of technology permits the supervisor to see both positive and negative results of the trainee's competence. This closer superior-subordinate relation will tend to result in the supervisor's evaluation of the trainee as less competent and normative than is the case in the craft technology.

In the drilling technology, especially on the drilling floor, the supervisor gains first-hand knowledge about the trainee's competence and normativeness. As the supervisor is frequently also a member of the work team, the trainee's competence and normativeness places constraints on him rather than on the co-worker. It is therefore expected that the supervisor in the drilling technology will evaluate the trainee least favourable on the competence and normativeness dimension, compared to the other types of technology.

Integration being primarily directed towards the informal work group, the supervisor should evaluate the trainee's integration in the same way as do co-workers and the trainees themselves. Craft technology is most conducive for integration, followed by continuous process, and at a distance by drilling technology.

On the basis of the above discussion, the following propositions are formulated, again, controlling for ethnicity of the trainee and size of work group.

Proposition III (3a): Supervisors employed in craft, continuous process, and drilling technology will evaluate the trainee as competent when ethnicity of the trainee and size of work group are controlled for in decreasing order.

Proposition III (3b): Supervisors employed in craft, continuous process, and drilling technology will evaluate the trainee as normative when ethnicity of the trainee and size of work group are controlled for in decreasing order.

Proposition III (3c): Supervisors employed in craft, continuous process, and drilling technology will evaluate the trainee as integrated when ethnicity of the trainee and size of work group are controlled for in decreasing order.

SUMMARY

This chapter develops the theoretical perspective that is intended to explain the phenomenon under investigation.

First, the socio-technical system refers to the close interdependence of a specific technology and the worker's orientation towards the organization, his work associates and his work. The petroleum industry has been characterized as a contemporary example of the continuous process technology. The analysis in this chapter goes beyond this conventional view by distinguishing continuous process, craft, drilling, and clerical technologies within the industry. The clerical technology is considered as being farthest removed from the other three types of technology as its workers are not concerned with technical processes of products.

In the second major section of this chapter, the theory of evaluative orientation is developed starting with Parsons' theory of action, and moving into Jung's theory of orientation. Similarities between the two theories are pointed out within the frame of Jung's six systems of telic orientation. In addition, Jung's explanatory principle of uncertainty is introduced, governing the process of orientation. Next, Parsons' instrumental and expressive complexes of orientation are described, and an ethical complex of orientation is formulated. The four problems of each complex are then interpreted as components of uncertainty. The instrumental, ethical, and expressive complexes are governed by different gradients of uncertainty, each explaining one aspect of the actor's evaluative orientation. The three major constructs of competence, normativeness, and integration are constituted by the respective component concepts of the instrumental, ethical, and expressive complexes.

Finally, the theory of evaluative orientation is combined with the theory of the socio-technical system and specific propositions about the relation between the two are formulated. Three sets of propositions are presented. The first two sets of propositions deal with the formal aspects of evaluative orientation within the petroleum industry, and within different types of technology in that industry. The third set of propositions relates to the evaluative content and the different evaluations given by actors in different types of technology within the petroleum industry.

Chapter 4

METHODOLOGY

In the previous chapter the theoretical framework for this study has been developed. The theory of evaluative orientation has been reviewed and further related to the industrial setting. Within the theory of evaluative orientation, the major constructs relevant for further analysis have been lexically defined and interpreted, and their relations to each other stated as propositions.

Constructs have been occasionally referred to as either theoretical concepts or T-concepts (Abell, 1971:27). To have any value in empirical science, constructs must be expressible in terms of observational concepts; then they are sometimes referred to as O-concepts (Abell, 1971:27). The operationalization and the development of indices is a methodological problem and the first major task of this chapter.

Next, the hypotheses corresponding to the propositions in Chapter 3 will be presented.

Third, factor analysis is discussed as a method for the formulation of theoretical constructs, as a method of establishing empirical relations between indices of evaluative orientation, and as a method for reducing the complexity of the data. Although factor analysis has been primarily employed for the last purpose, the first two uses are of specific interest in this study. Within the same section, other methodological techniques such as analysis of variance and covariance are discussed.

Finally, the conventional methodological topics, such as data collection procedures, coding of responses, data processing, and data analysis are also dealt with.

CONCEPTS AND INDICES

Operational definitions of concepts and the interpretation of observations as indicators of concepts are like two sides of the coin. The former spells out the procedures used in measurement by mapping concepts into observers (and their states), and the latter refers to the mapping of observers (and their states) into concepts (Jung, 1965:91). Whether the correspondence rule is referred to as operational definition or as an interpretation of an observation as an indicator of a concept is a matter of choice. Both imply that the procedure results in indicators that are imperfect in measuring the construct (Blalock, 1972:13).

Ideally, the operationalization of a construct is complete when its domain has been completely described and each component concept of that domain corresponds to specific observations. Bridgeman (1938:23) points out that ideally operations and theoretical definitions should be associated on a one-to-one basis. This is impractical if not impossible, and restrictions in terms of data gathering procedures and availability of collected data usually confine operationalization to a few indicators. The selection of indicators that meaningfully describe the construct is a matter of creativity and face validity.

Indicators in this dissertation are used in two ways: (1) as single indicators related to one construct, and (2) as indicators that are grouped according to the strength of their interrelationship to correspond to one construct. All background variables fall into the first category. All indicators relating to the evaluative orientation of the actor fall into the second category. In the second instance, index construction is a data-reduction technique by condensing the information into manageable categories, thereby implicitly creating a scale. To permit factor analysis, all indicators that are ordinal will be converted into interval measurements. Behind this transformation into variables lies the assumption that this procedure is preferable to tabular analysis (T. Hirschi & H. Selvin, 1973:164-174).

The problem of selecting units of analysis cannot be clearly separated from the problem of conceptual elaboration. The major clusters of concepts have been defined in the previous chapter: the background variables, the work milieu variables, and the evaluative orientation of actors towards alter(s).

Background Variables

Background information will be used for two purposes. First, it will provide information about the trainees' characteristics in a descriptive way. Second, background characteristics have a theoretical significance as control variables for the analysis of evaluative orientation.

Although many background variables of the northern trainee were available from the Trainee Information Summary Sheet (T.I.S.S.), not all items of information requested were completed conscientiously enough to be useful for analysis. The following concepts and their indicators will be used in this analysis:

Variable Concept	Indicator
Age	Date of birth, age calculated as of 1974.
Ethnicity	Father's and mother's ethnicity and official status in the case of Indians.
Marital status	Information obtained from trainee on entering training program (includes common-law spouse).
Number of children	Children for whom trainee takes responsibility.
Education	Highest grade completed.
Employment history	Last recent job before entering training program.
Northern residence	Residence at time of recruitment.
Southern experience (where obtainable)	Having been south of the 60th parallel for a period of time rather than just short visit. Previous employment in that area.

Work Milieu Variables

The theoretical orientation places the actor into a socio-technical system which influences his evaluative orientation. Emphasis is therefore placed on the type of technology.

Variable Concept	Indicator
Occupation	Particular position of trainee according to job descriptions.
Type of technology	Above occupations of the trainee grouped according to the four types as presented in Chapter 3.
Length of employment	Time is given in months up to the time of interview; or, if terminated, total time in training program.
Size of work crew	Number of workers (including trainee/s).
Training location	Precise location where trainee is stationed for training.

Variable Concept	Indicator
Training region	The grouping of all training locations into four regions: Mackenzie, Central Alberta and Foothills, Prairies, Cities.
Employing companies	Six participating companies directly or indirectly responsible for the Northern Training Program (subcontractors who employ some trainees are not considered).

Evaluative Orientation of the Actor

Whereas the interpretation of the constructs and component concepts is a theoretical issue, the formal aspects of these constructs and component concepts are derived by the factorial method from the indicators. First, component concepts are operationally defined by mapping the responses to questions into the conceptual domain. Second, their formal (mathematical) relations to each other is specified by factor analysis. The component concepts have served their purpose by defining the data domain on which the factor analysis has been performed. In addition, the analysis results in the induction of constructs that specify the precise relation of the component concepts to each other.

The major constructs, the component concepts and the respective indicators of the trainee, the co-worker, and the supervisor are presented next.

Trainee's Evaluative Orientation. Questions directed towards the trainees can be conveniently grouped into three categories. The first set of questions deals with the trainee's attitudes towards his employer, the second with the trainee's attitudes towards his supervisor, and the third with the trainee's attitudes towards his co-workers.

Construct	Component Concept	Indicator
Competence	Facility(-ties)	Satisfaction or dissatisfaction with working conditions. Is the trainee lonely, bored?
	Cooperation	Is the trainee given cooperation in his training? Does he feel like quitting?
	Disposal	Is the trainee willing to exchange his labour (stays) for what he receives?
	Sanctions	Is the trainee satisfied with the wages and fringe benefits he receives?
Normativeness	Privilege	Is the supervisor patient with the trainee?
	Loyalty(-ties)	How does the trainee get along with the supervisor?
	Authority	Does the supervisor ask or invite questions, or does he order the trainee to do jobs?
	Responsibility	Does the supervisor help the trainee by spending more time with him than with other workers?
Integration	Occasions	Do the co-workers show interest in the trainee or are they indifferent towards him?
	Symbolization	Are the co-workers friendly or unfriendly?
	Receptiveness	Are the co-workers helping the trainee, or not?
	Representation	Does the trainee feel accepted by the co-workers?

Co-Worker's Evaluative Orientation. As the data of this research were gathered for the purpose of evaluating the training program, the questions for the co-worker were geared towards his evaluation of the trainee. It was not attempted to examine the co-worker's evaluative orientation towards the work situation.

Again, component concepts and their indicators are grouped according to possible clustering into the three constructs elaborated in Chapter 3. The 12 variables presented below were selected from an array of questions directed towards the co-workers. Although the conceptual framework had not been developed at the time of the interviews, their general location within the three constructs was anticipated.

Construct	Component Concept	Indicator
Competence	Facility(-ties)	What is the trainee's ability to learn?
	Cooperation	What is the trainee's level of engagement in work?
	Disposal	Does the co-worker need to work harder because of a trainee being in the work group?
	Sanctions	What is the trainee's working skill?
Normativeness	Privilege	Does the co-worker prefer to work with the trainee rather than alone?
	Loyalty(-ties)	What is the trainee's interest in the operation?
	Authority	Does the trainee try to do well (within the company regulations)?
	Responsibility	Is the trainee responsible on the job?
Integration	Occasions	Is the trainee outgoing or shy?
	Symbolization	Is the trainee friendly or unfriendly?
	Receptiveness	Is the trainee considerate or not?
	Representation	Is the trainee accepted by the work-group?

Supervisor's Evaluative Orientation. The questions asked the supervisors are similar, though not identical, to those asked the co-workers.

Construct	Component Concept	Indicator
Competence	Facility(-ties)	What is the trainee's ability to learn?
	Cooperation	What is the trainee's level of engagement in work?
	Disposal	Does the supervisor treat the trainee differently from other workers?
	Sanctions	What is the trainee's working skill?
Normativeness	Privilege	Is the trainee guilty of unexcused unpunctuality and absenteeism.
	Loyalty(-ties)	How does the supervisor formally relate to the trainee?
	Authority	How does the trainee accept orders, refuse orders and supervision?
	Responsibility	Is the trainee responsible on the job?
Integration	Occasions	Is the trainee outgoing or shy?
	Symbolization	Is the trainee friendly or unfriendly?
	Receptiveness	Is the trainee considerate or not?
	Representation	How does the trainee fit into the work group?

Having related the constructs and component concepts to the indicators in the previous section, the following section presents the hypotheses.

HYPOTHESES

The formulated hypotheses below are derived from the propositions as developed in Chapter 3, pages 59, 62, 64, 68 and 70. The hypotheses numbers correspond with proposition numbers. The propositions have been converted into hypotheses by translating concepts into indicators.

Hypothesis I (1): Evaluative items of trainees entered in factorial analysis will separate into three identifiable factors that can be interpreted as competence, normativeness, and integration.

Hypothesis I (2): Evaluative items of co-workers entered in factorial analysis will separate into three identifiable factors that can be interpreted as competence, normativeness, and integration.

Hypothesis I (3): Evaluative items of supervisors entered in factorial analysis will separate into three identifiable factors that can be interpreted as competence, normativeness, and integration.

Hypothesis II (1): Evaluative items of trainees employed in continuous process, craft, drilling and clerical technology will fall into the conceptual pattern in decreasing order.

Hypothesis II (2): Evaluative items of co-workers employed in continuous process, craft, drilling, and clerical technology will fall into the conceptual pattern in decreasing order.

Hypothesis II (3): Evaluative items of supervisors employed in continuous process, craft, drilling, and clerical technology will fall into the conceptual pattern in decreasing order.

Hypothesis III (1a): Trainees employed in craft, continuous process, and drilling technology will successively have a lower group mean of competence in evaluating their relation with the company when ethnicity of the trainee and size of work group are controlled for.

Hypothesis III (1b): Trainees employed in craft, continuous process, and drilling technology will successively have a lower group mean of normativeness in evaluating their relation with the supervisor when ethnicity of the trainee and size of work group are controlled for.

Hypothesis III (1c): Trainees employed in craft, continuous process, and drilling technology will successively have a lower group mean of integration in evaluating their relation with co-workers when ethnicity of the trainee and size of work group are controlled for.

Hypothesis III (2a): Co-workers employed in craft, continuous process, and drilling technology will sucessively have a higher group mean of competence in evaluating their relation with the trainee when ethnicity of the trainee and size of work group are controlled for.

Hypothesis III (2b): Co-workers employed in craft, continuous process, and drilling technology will successively have a higher group mean of normativeness in evaluating their relation with the trainee when ethnicity of the trainee and size of work group are controlled for.

Hypothesis III (2c): Co-workers employed in craft, continuous process, and drilling technology will successively have a lower group mean of integration in evaluating their relation with the trainee when ethnicity of the trainee and size of work group are controlled for.

Hypothesis III (3a): Supervisors employed in craft, continuous process, and drilling technology will successively have a lower group mean of competence in evaluating their relation with the trainee when ethnicity of the trainee and size of work group are controlled for.

Hypothesis III (3b): Supervisors employed in craft, continuous process, and drilling technology will successively have a lower group mean of normativeness in evaluating their relation with the trainee when ethnicity of the trainee and size of work group are controlled for.

Hypothesis III (3c): Supervisors employed in craft, continuous process, and drilling technology will successively have a lower group mean of integration in evaluating their relation with the trainee when ethnicity of the trainee and size of work group are controlled for.

FACTOR ANALYSIS, ANALYSIS OF VARIANCE AND COVARIANCE

In this section I shall briefly discuss the reasons for the choice of the analytic methods employed in this dissertation.

Factor Analysis

Factor analysis is used as a method for the formulation of theoretical constructs, as well as a method of establishing empirical relations between indices of evaluative orientation to test the hypotheses corresponding to Propositions I and Propositions II. For both these purposes, factor analysis uses patterns of interrelationships between concepts as established by analysis of variance to form factors that can be interpreted within the theory of evaluative orientation. As factor analysis distinguishes between strong and weak indicators entered into the analysis, it minimizes the arbitrary exclusion of some indices and the inclusion of others. When items are entered into the factor matrix, their communality and loadings signify their importance within the conceptual scheme. Simple, clear-cut factors are not expected as a result of the unrepresentativeness of the collected data. Although some weak interrelationships across factors are to be expected, items should cluster with moderate or strong loadings in one factor only.

Factor analysis is a stepwise process whereby each step involves research design alternatives, the selection among which may well alter the factor results. In this line of reasoning, several items are entered into the original analysis and those with a communality below .4 as well as producing loadings below ± .4 on all factors are excluded in the further analysis. All other items are retained and again factor analysed to arrive at the 'ideal factor structure'. The only theoretical restriction in this selection is that for each component concept at least one item is retained.

In addition to the above uses, factor analysis is employed as a method for reducing the complexity of the data. Factor analysis allows the grouping of all variables into scales (according to factors) by means of transforming subject responses into factor scores. These permit the testing of the hypotheses derived from Propositions III.

The following procedures have been employed:

1. R-factoring method to establish correlations between variables.

2. Principle factor solution to extract factors. It is the most widely accepted and commonly used factor model. This method automatically replaces the main diagonal elements of the correlation matrix with communality estimates. Iteration procedures are used for improving the estimates of communality.

3. Orthogonal varimax rotation that assumes uncorrelated factors and simplifies the columns of the factor matrix for the analysis and for the calculation of factor scores.

Analysis of Variance and Covariance

The hypotheses corresponding to Propositions III combine categorical, nominal, and interval scales. The former two are composed of some background variables and types of technology, whereas the interval scales are composed of some other background variables, some metric covariates and criterion variables.

Analysis of variance and covariance is used to test the Hypotheses III. Since the independent and control variables are non-manipulative, unequall cell frequencies are to be expected. For this reason the classical experimental approach is used as the most suitable.

Although most commonly covariates are inserted into the design to remove extraneous variation from the dependent variable, thereby increasing measurement precision, covariate and control variable effects are expected to be of equal interest.

As the total sample is analysed by sub-units that have a small frequency, meaningful differences in the analysis of variance are taken at face value, though I am aware that random errors may partially affect these results. Multiple classification analysis scores are examined and the pattern of changes in the effects of a given variable, as more covariates are introduced, are explained.

DATA COLLECTION, CODING RESPONSES, DATA PROCESSING AND DATA ANALYSIS

Data Collection

The data used in this dissertation were collected for an evaluation of the Northern Training Program.[1] In order to obtain comprehensive statements of the view points of all who are significantly involved in, or affected by the program, it was decided to interview the following groups of people:

1. the northern trainees
2. the co-workers of the crews to which the trainees were assigned

---

[1] In June 1974, Dr. Charles Hobart of the University of Alberta was approached by representatives of the T.T.F. of Canadian Arctic Gas Study Limited concerning the possibility of an evaluation study of the Northern Training Program which the T.T.F. was supervising. The author of this dissertation was his research assistant.

3. the immediate supervisors or foremen

4. the superintendents or section supervisors who had responsibility for a part or the whole operation at a work site to which the trainees were assigned

5. the T.T.F. personnel who are charged with responsibility for organizing and coordinating the training program.

Interview Procedures. Because there were well over 250 persons to be interviewed, it did not seem feasible to use focused interview or other unstructured interviewing procedures in the collection of the data. Accordingly, it was decided to construct separate formal interview schedules for the trainees, co-workers, immediate supervisors and superintendents, supplemented by information obtained under the category "additional comments".

The interview schedule used for the trainees was designed to obtain information on the background of the trainee, his reaction to the training program, to his foreman and work site, his particular satisfaction or dissatisfaction with the employer, and his suggestions for improvement of the program.

Generally, the formal schedules for co-workers, supervisors and superintendents were designed to obtain information on six areas: some of the social background characteristics of the respondent, his length of service and status with the company, his experience with northern trainees, his reactions to the training program, his assessment of the trainees, his previous experience, and his suggestions for the improvement of the program.

As the training program was unique of its kind, it was decided to include all respondents at a particular time; pretesting was not possible. Accordingly, the procedure followed was to produce the most comprehensive and carefully prepared interview schedule, adding or modifying items on the basis of experience with the first few respondents interviewed. As a result, responses to a few items are incomplete because these items were added or reformulated after a few men had already been interviewed. (Most other incomplete responses are, of course, due to the respondents' refusal to answer some questions.)

The questions of the interview schedules relevant to this dissertation are presented in Appendix A.

Administration of Interview Schedules. The interviews for this study were carried out primarily by three men. The trainees who were highly representative of native ancestry were interviewed by a young Treaty Indian who had previous experience in interviewing terminees from the Northern Training Program. The supervisors and superintendents were interviewed by the project director, or by myself. The co-workers were interviewed by a graduate student of the Department of Sociology, University of Alberta, who had had experience working in the oil industry and who also had previous interviewing experience.

This interviewing team entered the field late in July 1974, and most of the interviewing was completed by the middle of September, with the exception of a few widely-scattered individuals who had been absent during the major interview period. These were contacted and interviewed later.

The data collection was complicated by the fact that northern trainees were stationed at 31 different work sites in the Northwest

Territories, Alberta, and Saskatchewan. Furthermore, the trainees were receiving training in as many as seven different kinds of operation: gas treatment plants, gas compressor stations, oil drilling rigs, oil exploration base camps, oil refineries, oil company accounting offices, and maintenance service centers. A further obstacle encountered was the difficulty in distinguishing between co-workers, senior wage earners, and supervisors at various levels. Finally, the fact that there was considerable mobility among the various categories of people to be interviewed complicated the data collection process. Vacation time, transfers, and resignations from the company on the part of the trainees and supervisory personnel in particular added to the challenge of collecting a complete set of interview responses.

Two different ways of data collection were adopted. In the work sites of Alberta and Saskatchewan, the interviewers operated as a team. The management at the site was contacted in advance and an appointment was made for the team's visit. Upon arrival at the site, the senior interviewer explained in detail the purpose of the study, laid out the proposed interview procedure, and identified the men to be interviewed. Virtually all interviews, irrespective of category of respondents, were conducted in an office at the plant or work site, and in all cases in complete privacy.

In the Northwest Territories, the interviewing was carried out by the project director, by myself, and the native interviewer. Because of the fact that the men to be interviewed by the different interviewers were dispersed in geographically widely separated locations, the three interviewers operated independently. An unforeseen outcome of this was the loss of supervisory control over the native interviewer, with the unfortunate consequence that certain locations on his interviewing itinerary were never visited and the men stationed there, or the terminees residing there, were not contacted. As a result, six trainees actually stationed at Northern work sites during the interview period were not interviewed. By the time it became apparent that this native interviewer would not complete his assignments, it was too late to hire and train another native interviewer.

The outcome of this procedure was that a total of 72 trainees, 61 co-workers, 61 immediate supervisors, and 43 superintendents were interviewed during the course of the study. The co-workers of 29 trainees (mainly terminees), the immediate supervisors of ten trainees, and the superintendents of three trainees as called for in the overall research design, despite several call-backs at the work sites, were not interviewed. The thus missing information pertains to the Delta region where transfer and turnover of manpower are extremely high because drilling rig crews are not permanent employees, typically.

The interview team received excellent cooperation at all work sites visited. It happened not infrequently that supervisors stayed on after their normal quitting time, that men were released from their normal duties so that they could be interviewed; and efforts were made in every way to facilitate the accomplishment of the interviewing objectives. This positive attitude no doubt accounted for the fact that no refusal for an interview from any of the people contacted was encountered. There were of course some items to which interviewees did not respond, but relatively complete interview schedules were obtained from all respondents.

Coding of Responses

The interview schedules were structured in such a way that most anticipated answers were pre-coded. These questions did not require additional operation for transformation. Some questions, however, had a specific set of pre-coded answers, but the investigators were aware that many alternative responses could be elicited. If responses would fall into the latter category, they had to be coded by means of assessing the total responses and classifying them into groups large enough for analysis, yet significant enough to warrant a separate category.

A second group of questions was open-ended. These responses were written on a separate sheet initially and then grouped according to content and coded. The specific code which had been established in this way was then applied to each particular response.

The third set of data were obtained by the coding of general responses, either to specific issues or as additional information at the conclusion of the questionnaire. Needless to say, the responses were difficult to classify and translate into codes for computer analysis. Certain information was impossible to codify; it will be used intermittently for illustrative purposes or to give more detail to the coded analysis.

Data Processing and Data Analysis

The collected responses from the interview schedules were of two types: (a) pre-coded answers to which each possible response was assigned a number, or (b) open-ended questions which had to be re-coded later.

Statistical Package for the Social Sciences (SPSS) is used for the analysis of the data in this dissertation.

SUMMARY

This chapter deals with the methodological issues of the dissertation.

First, concepts are transformed into indicators. Background indicators of the trainee and indicators of the work milieu are used as singletons. Indicators of the evaluative orientation of the actor are grouped according to their conceptual relationship. For the trainee, the co-worker, and the supervisor twelve indicators, each one corresponding to the component concepts, have been selected. Their formal relations to each other are specified by factor analysis.

Second, three sets of hypotheses, derived from the propositions as developed in Chapter 3, are presented. The first set tests the formal aspects of the three constructs - competence, normativeness, integration - of the trainee, the co-worker, and the supervisor separately. The second set tests the formal aspects of these three constructs for the types of technology independently. The third set of hypotheses examines the factual content of these constructs for the trainee, the co-worker and the supervisor according to type of technology.

Third, methods employed are discussed and reasons for their choice given. Factor analysis, as a method, is considered most useful for the formulation of theoretical constructs, as a method of establishing empirical relations between indices of evaluative orientation, and to reduce the complexity of the data. The R-factoring method and principle factor solution with orthogonal varimax rotation are selected as the most fruitful procedure. Analysis of variance and covariance as a method is employed to establish meaningful differences among group means of factor scores of evaluative orientation according to different types of technology. Ethnicity and size of work group are introduced as control variables in the analysis of variance.

Finally, conventional methodological topics, such as data collection, coding responses, data processing and data analysis are discussed. Most of the data collection in 31 localities, primarily in Alberta, was completed within six weeks by a team of three interviewers. A high response rate from those persons who could be contacted was achieved. Seventy-two out of 76 trainees still in the program at the time of interviewing were contacted and interviewed, whereas only three out of 34 terminees could be reached. In addition, 61 co-workers and 61 supervisors were interviewed and asked questions about 81 trainees and 101 trainees respectively. The missing information pertains primarily to people in the Delta region. Most of the questions relevant to this dissertation were pre-coded and did not require additional operation for transformation. The SPSS was used for the computer analysis of the data.

Chapter 5

BACKGROUND CHARACTERISTICS OF CONTINUING AND TERMINATED NORTHERN TRAINEES

In this chapter the most relevant demographic background characteristics of all trainees, continuing and terminated, are first presented. Then, these demographic background characteristics are compared to establish simple relations.

Most of the data are based on the Information Summary Sheets of trainees, completed prior to joining the training program. In some instances the information on these is not complete; nor could the missing information be retrieved by interview or other means.

DEMOGRAPHIC BACKGROUND CHARACTERISTICS OF NORTHERN TRAINEES

As of September 1974, 111 northern trainees were enrolled in the T.T.F. Northern Training Program. Thirty-four of them had terminated as of that date.

Age Distribution

Most of the trainees were young: 16 were aged 20 or less, 24 were aged 31 or 22, 23 were aged 23 or 24, 28 were aged 25 to 28 years, and 15 were over 28 years of age with the oldest 43 years old. A comparison between terminees and those who stayed in the Program shows to my opinion no meaningful differences. Both groups are fairly equally

equally represented in all age groups (Table 5-1).

Table 5-1

Age Distribution of Continuing and Terminated Trainees

Age Groups	Continuing		Terminated		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
19 - 20	11(2)[a]	14.3(2.6)	5	14.7	16(2)	14.4(1.8)
21 - 22	16(2)	20.8(2.6)	8	23.5	24(2)	21.6(1.8)
23 - 24	16	20.8	7	20.6	23	20.7
25 - 28	21(3)	27.3(3.9)	7	20.6	28(3)	25.2(2.7)
29 - 34	7	9.4	3	8.7	10	9.0
35 - 43	4	5.2	1	2.9	5	4.5
No response	2	2.6	3	8.8	5	4.5
Total	77(7)	100.0(9.1)	34	100.0	111(7)	100.0(6.3)

[a] Figures for females are given in brackets.

Ethnicity

In terms of ethnic origin, 36 of the trainees were Inuit, 37 Status Indian, 25 were Non-Status Indian or Metis, and 13 were White. Table 5-2 indicates the overrepresentation of Inuit who left the training program as well as the underrepresentation of Whites among terminees. The number of Metis is too small to derive at any conclusion from the data. It has therefore been included in the category of Non-Status Indians (N/S Indians).

Table 5-2

Ethnicity of Continuing and Terminated Trainees

Ethnicity	Continuing		Terminated		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Inuit	18	23.4	18	52.5	36	32.4
Status Indians	26	33.8	11	32.4	37	33.3
N/S Indians[a]	23	29.9	2	5.9	25	22.5
White	10	13.0	3	8.8	13	11.7
Total	77	100.0	34	100.0	111	100.0

[a] Included are 3 Metis.

Marital Status and Number of Dependents

Of the 111 trainees, 69 were single, 37 were married and one was widowed. (For the purpose of simplification, the latter was included in the married category; no data on marital status was available for three trainees.) Seventy-three of the trainees had no children. Of the remaining group, the largest number had two children (Table 5-3). The highest number of children was five. There were no marked differences in terms of marital status when related to termination, though those with no dependents terminated slightly more frequently than those with one or more dependents.

Education

Most of the trainees in the program had some high school education, and 28 of them had completed grade 12. Thirty-six had completed

?

Table 5-3

Marital Status and Number of Dependents
of Continuing and Terminated Trainees

Marital Status and Number of Dependents	Continuing		Terminated		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Single	47	61.0	22	64.7	69	62.2
Married - no children	2	0.7	2	5.9	4	1.8
1 child	4	5.2	5	14.7	9	8.1
2 children	15	19.5	-	0.0	15	13.8
3 children	7	9.1	1	2.9	9	8.1
4 children	1	1.3	-	0.0	1	0.9
5 children	-	0.0	2	5.9	2	1.8
No response	1	1.3	2	5.9	3	2.9
Total	77	100.0	34	100.0	111	100.0

grades 6, 7, 8 or 9 and only four had less than grade 6. Forty-one had had a variety of upgrading or specialized training experience, ranging from low level courses such as Basic Job Readiness Training and upgrading for grade 8, to highly specialized courses such as telecommunication and electronics, accounting and business management. Six of the trainees had taken their training in the Canadian provinces, while 31 had obtained theirs in the Northwest Territories or in the Yukon. One had attended university in the United States for one year, and another trainee reported having taken a university level course per correspondence. Two did not specify the type of courses they took. Only six trainees reported having had apprenticeship training, one trainee for as long as 48 months, and two trainees held a journeyman's certificate. It is relevant to point out that terminees are rather heavily overrepresented in terms of those individuals with less than grade 10 education, as were those with post-secondary education consisting solely of academic upgrading. Terminees were overrepresented in the group whose post-secondary education was received in the North. None reported having taken post-secondary training in the South. This would suggest that this type of structured or disciplined exposure to the expectations of the dominant society in the South, in a context where regularity, punctuality and responsibility are consistently demanded, is a factor contributing to perseverance in the training program (Table 5-4).

Table 5-4

Years of Formal Education of Continuing
and Terminated Trainees

Grade Completed	Continuing		Terminated		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
3	-	0.0	1	2.9	1	0.9
4	-	0.0	1	2.9	1	0.9
5	1	1.3	1	2.9	2	1.8
6	3	3.9	2	5.9	5	1.8
7	5	6.5	5	14.7	10	9.0
8	4	5.2	7	20.6	11	9.9
9	7	9.1	3	8.8	10	9.0
10	16	20.8	4	11.8	20	18.0
11	16	20.8	7	20.6	23	20.7
12 or more	24	32.5	3	8.8	28	25.2
Total	77	100.0	34	100.0	111	100.0

Employment History

The available information regarding previous employment cannot be taken as very reliable. It is very difficult to obtain accurate information on employment in the North because of part-time or seasonal employment. The discussion in this section will therefore focus primarily on the trainees' most recent employment prior to entering the Program.

Thirty-seven of the trainees held no previous employment, according to the data available. Of the remaining 74, the largest number had been employed by government agencies (46%) and by large corporations (mostly oil or drilling companies - 40%). Thirty-eight (53%) held down their last previous job for no more than three months; 22 (30%) for four to 11 months, and only 12 (17%) had been employed previously for more than a year. Twenty-eight worked as labourers or helpers, 29 had other unskilled or semi-skilled occupations, two were employed as skilled workers, and 14 in clerical positions.

Residence at Time of Recruitment

At the time the trainees joined the Program, 12 came from various settlements on the Arctic coast, 40 from the Mackenzie Delta and Old Crow, 12 were from Central Mackenzie settlements, 40 from the larger towns in the southern part of the Northwest Territories and Yukon, and six were from Alberta or northern British Columbia (Figure 5-1). Among the terminees, those from the Mackenzie Dalta and the Yukon were overrepresented, and those from the Yellowknife area and from the provinces were underrepresented (Table 5-5).

Figure 5-1

HOME RESIDENCE OF NORTHERN TRAINEES

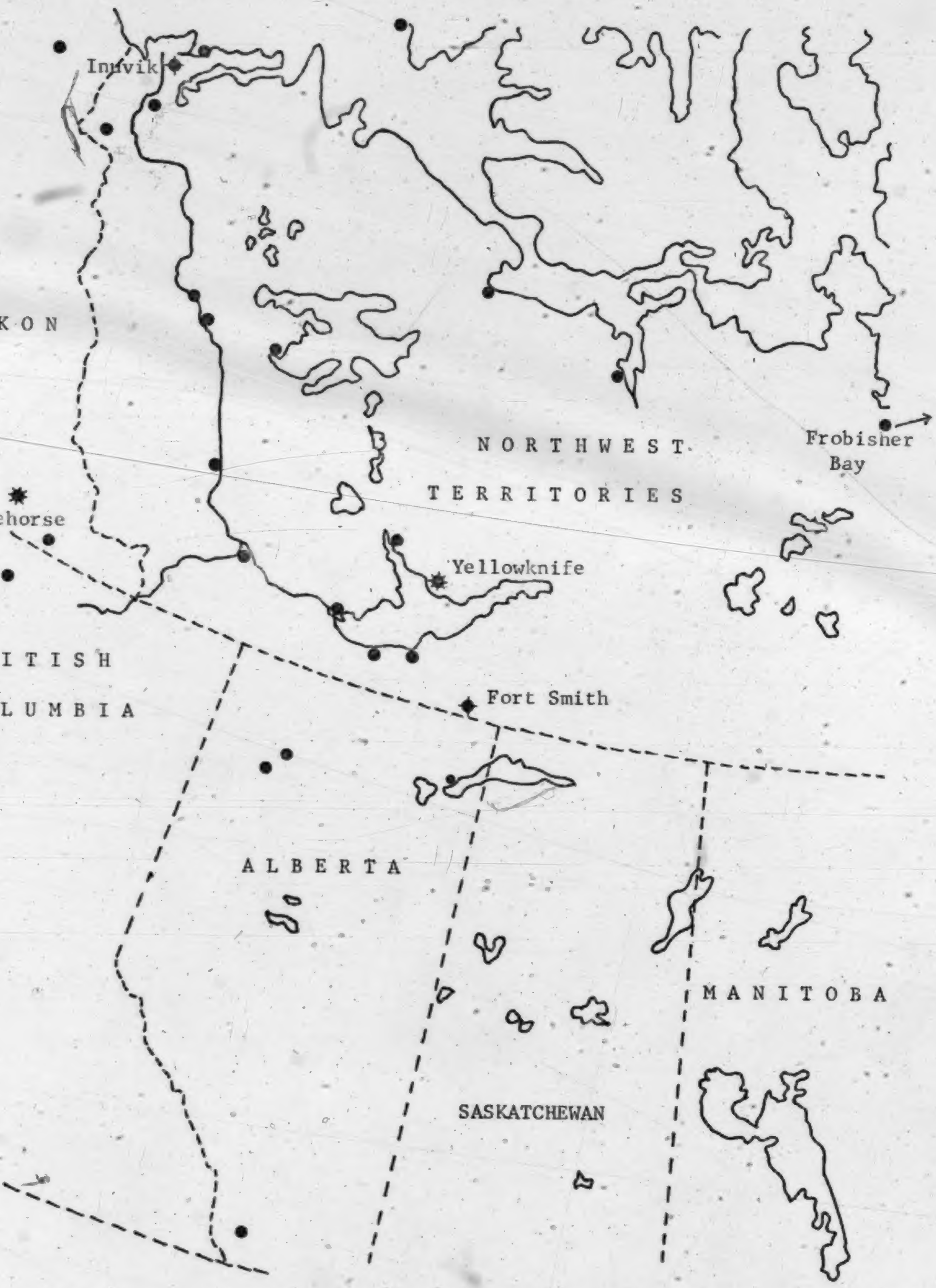

Inuvik
YUKON
NORTHWEST
TERRITORIES
Frobisher
Bay
Whitehorse
Yellowknife
BRITISH
COLUMBIA
Fort Smith
ALBERTA
MANITOBA
SASKATCHEWAN

Table 5-5

Home Region at Time of Recruitment for Continuing and Terminated Trainees

Home Region	Continuing		Terminated		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Arctic	10	13.0	5	14.7	15	13.5
Mackenzie Delta[a]	19	24.7	18	52.9	37	33.3
Mackenzie Central	9	11.7	3	8.8	12	10.8
Southern N.W.T. & South Yukon	33	42.9	8	23.5	41	36.9
Alberta & B.C.	6	7.8	0	0.0	6	5.4
Total	77	100.0	34	100.0	111	100.0

[a] For complete list of home residence at time of recruitment see Appendix B, Table 1.

Southern Experience

The Information Summary Sheet contained no information on the trainee's experience in the South prior to his entry in the Program. Hence the following discussion is limited to the continuing trainees that could be interviewed as of September 1974.

Forty-one trainees had never been in the Canadian provinces before they enrolled in the training program; of the 36 trainees who had, 15 reported having visited only once, and five only twice. Twenty trainees had worked in the provinces before joining the Program, half of them for at least a year. Twelve trainees had been working at the site at which they were interviewed for at least one year, 26 trainees for seven to 12 months, and 33 for less than seven months. No data were available for six men.

CONTRASTIVE BACKGROUND CHARACTERISTICS OF NORTHERN TRAINEES

So far major background characteristics of continuing and terminated trainees have been described. To gain more coherent understanding of some of these characteristics, crosstabulation was employed to establish patterns between ethnicity, education, home region, and southern experience.

Education and Ethnicity

The figures in Table 5-6 indicate that there are significant differences between ethnic groups. The Inuit are the least educated - one third of them not exceeding grade 7. In fact, over 63 per cent of all trainees in the lowest educated category are of Inuit origin.

Table 5-6

Educational Categories by Ethnicity of Northern Trainees

Grades Achieved	Inuit		Status Indian		N/S Indian		White	
	No.	%	No.	%	No.	%	No.	%
3 - 7	12	33.3	4	10.8	3	12.0	0	0.0
8 - 9	9	25.0	7	18.9	2	8.0	2	15.4
10	5	13.9	6	16.2	4	16.0	4	30.8
11	5	13.9	13	35.1	4	16.0	3	23.1
12 or more	5	13.9	7	18.9	12	48.0	4	30.8
Total	36	100.0	37	100.0	25	100.0	13	100.0

The Status Indian trainees are better educated than the Inuit, but still less than the Non-Status Indians. When combining all Indians, they come close to the white trainees in educational achievements, with the difference that they represent more cases in the two lowest categories. Trainees of white origin have definitely gained the highest education levels in comparison to the other ethnic groups; none of them have less than grade 8.

Considering both, ethnicity and education of terminees, we do not find a clear-cut pattern. Among Inuit, those with grade 3 to 9 make up over 70 per cent of all terminees; ~~but~~ among Indians those with grade 11 acoount for more than 50 per cent. Terminees of white origin, with at least grade 10, account for over 66 per cent in that group.

In summary, ethnicity is one important factor accounting for variations of educational level achieved. However, there exists no strong uniform relation between levels of education and ethnicity among terminees.

Home Region and Ethnicity

As discussed above, the training program encourages the selection of natives in different regions primarily north of the 60th parallel. As Inuit, Indians, and Whites are differentially dispersed throughout the North, the trainees' home residence reflects this variation. With the exception of one, all Inuit trainees come either from the Arctic or the Mackenzie Delta region (Table 5-7). Indeed, they account for 67 per cent of all trainees recruited from as far West as Old Crow and as far east as Bathurst Inlet north of the 65th parallel.

Table 5-7

Home Region by Ethnicity at Time of
Recruitment of Northern Trainees

Home Region	Inuit		Status Indian		N/S Indian		White	
	No.	%	No.	%	No.	%	No.	%
Arctic	11	30.6	3	8.1	0	0.0	1	7.7
Mackenzie Delta	24	66.7	11	29.7	2	8.0	0	0.0
Mackenzie Central	1	2.8	5	13.5	6	24.0	0	0.0
Southern N.W.T. & South Yukon	0	0.0	15	40.5	14	56.0	12	92.3
Alberta & B.C.	0	0.0	3	8.1	3	12.0	0	0.0
Total	36	100.0	37	100.0	25	100.0	13	100.0

Trainees of Indian origin are recruited from all regions of the Territories except the high Arctic, and some from Alberta and northern British Columbia. The majority come from the southern regions of the Territories although there is a fair number from the Mackenzie Delta. Of all those recruited in the Mackenzie Delta, the Status Indians alone comprise nearly 30 per cent.

Trainees of white origin come from four larger centers: Whitehorse, Yellowknife, Ft. Smith and Frobisher Bay. Within the southern N.W.T. and Yukon region they account for nearly 30 per cent.

Taking both ethnicity and home region into consideration, Inuit from the Mackenzie Delta have the highest termination rate (75%). Indians from the same region show also a relatively high termination rate (50%), followed by those Indians of the southern N.W.T. and Yukon (41%).

There are no terminees from the Alberta and B.C. region. Terminees of white origin are exclusively from Whitehorse in the Yukon.

Southern Exposure and Ethnicity

Information on the trainees' southern exposure is only available for those who could be interviewed. Table 5-8 shows that the Inuit had least, and Whites had most frequently been as far south as the Edmonton region. Those Inuit who had been south, never spent more than four years there, whereas over nine per cent of the Indians and 40 per cent of the white trainees spent more than ten years in the South; some of them having virtually spent their entire life there. (Two Indians come from southern Alberta reservations.)

In addition, the majority of white trainees have had employment in the South (60%), whereas the majority of Inuit and Indian trainees claimed no such experience (Table 5-9).

Table 5-8

Southern Exposure and Ethnicity of Northern Trainees

Having been South	Inuit		Indian		White	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Never	13	68.4	17	39.5	4	40.0
1 year or less	4	26.4	18	41.8	1	10.0
1 to 9 years	1	5.3	4	9.2	1	10.0
10 years & more	0	0.0	4	9.3	4	40.0
Total	19	100.0	43	100.0	10	100.0

Table 5-9

Previous Employment in the South and Ethnicity of Northern Trainees

	Inuit		Indian		White	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Never	15	78.9	30	69.8	4	40.0
1 year or less	3	15.8	8	18.6	1	10.0
1 to 4 years	1	5.3	5	11.5	5	50.0
Total	19	100.0	43	100.0	10	100.0

The relevance of this differential experience in the South is primarily limited to those trainees who were relocated to work sites in Alberta or Saskatchewan.

Education and Home Region

The previous discussion has shown that Inuit trainees have been recruited primarily from the Arctic region and have less education than the Indian trainees. In turn, Indian trainees are geographically distributed in the central and southern home region, having somewhat less education than Whites. White trainees come primarily from larger southern centers of the North and exhibit a higher minimum level of education than do Indians. Thus, the further south the trainee's home region, the higher is his average educational level, generally. Table 5-10 reflects this pattern.

Termination of northern trainees as related to home region and

Table 5-10

Education by Home Region of Northern Trainees

Education	Arctic		Mackenzie Delta		Central Mackenzie		S. N.W.T. & S. Yukon		Alberta & B.C.	
	No.	%	No.	%	No.	%	No.	%	No.	%
3 to 7	5	33.3	8	21.6	3	25.0	3	7.3	0	0.0
8 to 9	3	20.0	9	24.3	2	16.7	5	12.2	1	16.7
10	3	20.0	2	5.4	1	8.3	12	29.3	1	16.7
11	3	20.0	11	29.7	2	16.7	8	19.5	1	16.7
12 & more	1	6.7	7	18.9	4	33.3	13	31.7	3	50.0
Total	15	100.0	37	100.0	12	100.0	41	100.0	6	100.0

education is as inconclusive as ethnicity and education. Termination from the Mackenzie Delta is high, irrespective of education level. This region accounts for 50 per cent or more of the terminees in each educational category, with the exception of those who achieved grade 10. Regrettably, the small number of terminees in each category does not lend itself to a more detailed analysis.

Education and Southern Experience

A trend similar to previously discussed characteristics is visible when crosstabulating education and southern experience. The educational grade achieved by the trainee increases with his experience in the South. Twenty-two per cent of the trainees with lower educational grades (3 to 8) had been in the South. Forty per cent with grade 9, 10 or 11 had been in the South. And over 84 per cent of trainees with grade 12 and more had been in the South.

SUMMARY

The Northern Training Program is by necessity selective in its recruitment of trainees. It attracts primarily northerners who are young, fairly well educated, and of mixed ethnicity. Eighty per cent of the trainees are below the age of 28, 64 per cent have completed at least grade 10, and over 85 per cent are of Inuit or Indian ancestry. Over 94 per cent come from north of the 60th parallel; 80 per cent of these are recruited from the Mackenzie region.

The background characteristics of the northern trainees emerge as patterns, centering around the trainees' ethnicity.

Inuit trainees are recruited primarily from their northern home regions, have achieved less education, and have had less exposure to the South.

Indian trainees are recruited from all regions except the high Arctic, have a higher educational level, and have been more frequently exposed to the South than the Inuit. Among these Indian trainees, Non-Status Indians are somewhat better educated, are recruited primarily from the southern regions of the Northwest Territories, and have had more southern experience than the Status Indians.

White trainees come from larger centers, such as Whitehorse or Yellowknife, have a higher general level of education and have had most southern experience as compared to the other ethnic groups.

Ethnicity, then, can be considered as the most important variable that explains most of the variations in the other background attributes of the northern trainees. Therefore, ethnicity is used as a control variable in the analysis of variance in Chapter 8.

Chapter 6

THE EMPLOYMENT SETTING OF NORTHERN TRAINEES: THE SOCIO-TECHNICAL PERSPECTIVE

This chapter describes the northern trainees' employment circumstances within the framework of the socio-technical system. First, figures on distribution of continuous and terminated trainees according to the participating companies and according to training locations are given. Second, the specific occupations within the appropriate type of technology available to the northern trainees are described in some detail. Finally, termination rates with regard to year of entry and reasons for termination are presented.

Employing Companies

In Chapter 2 it was pointed out that the Northern Training Program is the outgrowth of a previous training program instituted and operated by Alberta Gas Trunk Lines (A.G.T.L.). At the time of data collection, 22 trainees, who had commenced training under the A.G.T.L. program, were still in the Northern Training Program. Of these, 12 trainees had entered it as early as 1971; seven and three had entered the program in 1972 and 1973 respectively. Fifty trainees were accepted for training under the auspices of the T.T.F. in 1973 (31 trainees during October of that year alone) and 39 trainees entered during the first nine months of 1974.

The following companies have offered employment to northern trainees : A.G.T.L., Shell Canada, Gulf, Imperial Oil, Trans Canada Pipe Lines (T.C.P.), and Canadian Arctic Gas Study Limited (C.A.G.S.L.) (Table 6-1). The number of northerners accepted for training is definitely related to the size of the company and its length of involvement in the training program.

No figures on termination from the A.G.T.L. program are available. Termination rates from the T.T.F. program for the years 1973 and 1974 are as follows: 8.3 per cent of the trainees who had entered the program in 1971-72 left it in the period between 1973-74; 49 per cent who entered in 1973 had terminated that same year; 18 per cent of those who had entered in 1974 had left by summer 1974. Thus, terminees are heavily overrepresented among those who entered the program in 1973, and are underrepresented among those who entered before or after that year.

It would appear from these data that continuation in the program is most characteristic of those trainees who joined early and have undergone a "weeding-out" process, and to a lesser extent of those who joined during 1974 among whom the weeding-out process had not been completed. Most terminees effect their withdrawal four to six months following their entry into the training program. Since employing companies have made specific training positions available to northerners at different times, the termination figures in Table 6-1 reflect partly the different times of entry of these companies as employers. A.G.T.L., the originator of the program, has in its employ trainees of long standing, but at the same time makes new positions available. T.C.P. had joined the program merely three months prior to the survey, at which time no trainee had yet terminated.

Table 6-1

Employing Companies for Continuing and Terminated Trainees

Company	Continuing		Terminated		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
A.G.T.L.	26	33.8	5	14.7	31	27.9
C.A.G.S.L.	4	5.2	0	0.0	4	3.6
Gulf Oil	14	18.2	9	26.5	23	20.7
Imperial Oil	13	16.9	8	23.5	21	18.9
Shell	12	15.6	12	35.3	24	21.6
T.C.P.	8	10.4	0	0.0	8	7.2
Total	77	100.0	34	100.0	111	100.0

The variation in termination rates according to employing companies may be explained by the fact that the number of training positions offered by the companies vary with regard to the different types of technology. The latter is seen as affecting termination rates differently. Table 6-2 presents the number of trainees employed by the specific companies in specific types of technology. C.A.G.S.L. offers clerical positions only. T.C.P. offers continuous process operator positions only. By contrast, A.G.T.L. offers a variety of occupations in three types of technology: continuous process, craft, and clerical. The remaining three companies offer training positions in several types of technology, but primarily in the drilling technology. The impact the type of technology has on the termination rate will be discussed later.

Table 6-2

Employing Companies by Type of Technology of Northern Trainees

Employing Company	Continuous Process		Craft		Drilling		Clerical	
	No.	%	No.	%	No.	%	No.	%
A.G.T.L.	13	29.5	17	81.0	0	0.0	1	10.0
C.A.G.S.L.	0	0.0	0	0.0	0	0.0	4	40.0
Gulf Oil	8	18.2	0	0.0	14	38.9	1	10.0
Imperial Oil	5	11.4	4	19.0	9	25.0	3	30.0
Shell	10	22.7	0	0.0	13	36.1	1	10.0
T.C.P.	8	18.2	0	0.0	0	0.0	0	0.0
Total	44	100.0	21	100.0	36	100.0	10	100.0

Training Locations

Training locations are distributed over a wide geographical area (Figure 6-1) for the following reasons. Some employing companies have operations in specific regions only (Table 6-3). Furthermore, employing companies with the assistance of T.T.F. official, select training locations according to several factors: the need for and/or the ability to absorb additional trainees within a specific operation, the anticipated receptiveness of the work associates towards northern trainees, and the availability of equipment that best facilitates the preparation of trainees for future northern operations. By virtue of localities available and by virtue of the above factors that require consideration on part of the employing companies, not all trainees are relocated to training sites that are most congenial to them.

Figure 6-1

Training Locations of Northern Trainees

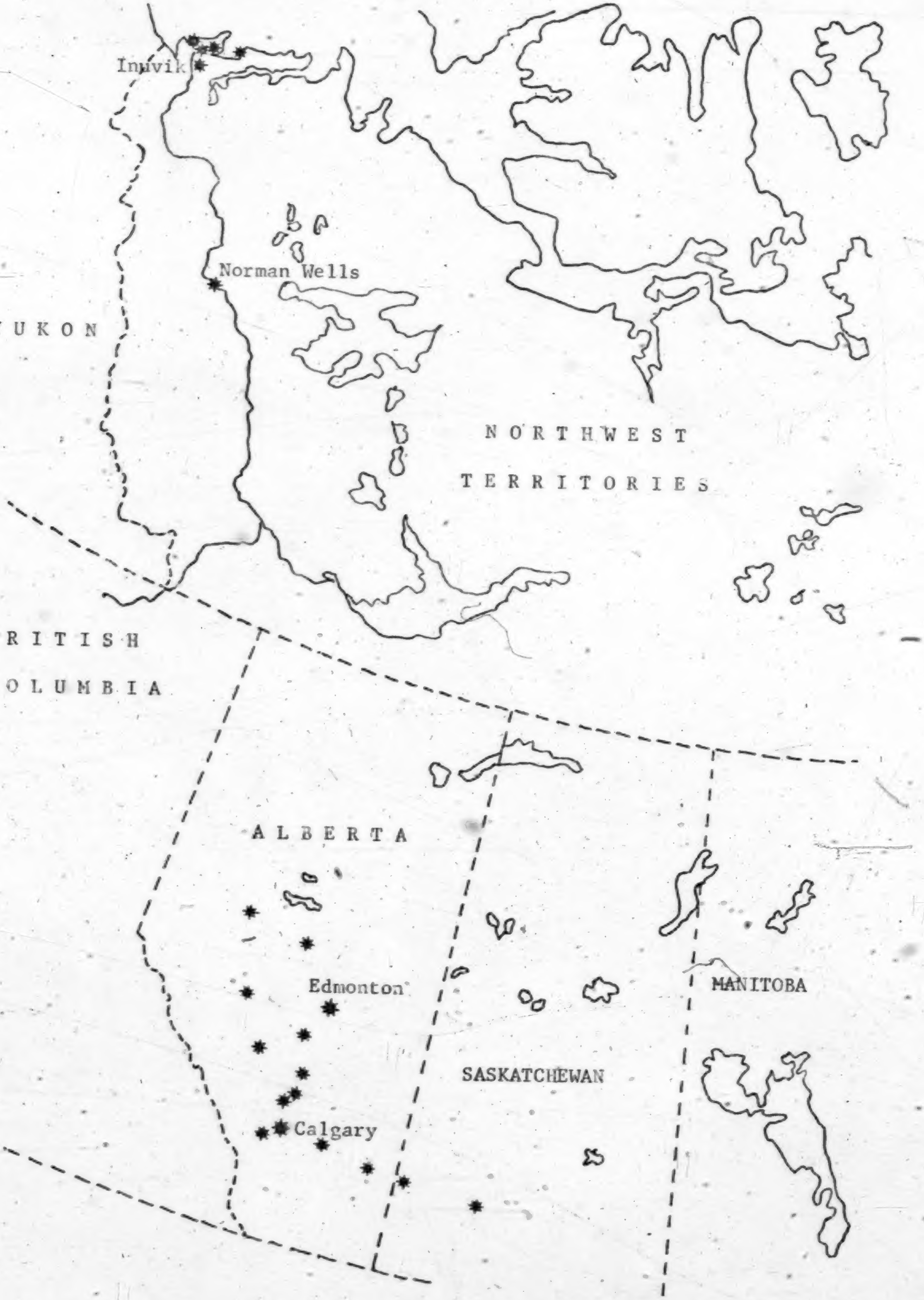

Inuvik
Norman Wells
YUKON
NORTHWEST
TERRITORIES
BRITISH
COLUMBIA
ALBERTA
Edmonton
Calgary
SASKATCHEWAN
MANITOBA

Table 6-3

Employing Companies and Training Regions of Northern Trainees

Employing Company	Mackenzie		Foothills and Central Alberta		Prairies		Cities	
	No.	%	No.	%	No.	%	No.	%
A.G.T.L.	0	0.0	10	30.3	9	52.9	12	57.1
C.A.G.S.L.	0	0.0	0	0.0	0	0.0	4	19.0
Gulf Oil	14	35.0	8	24.2	0	0.0	1	4.8
Imperial Oil	14	35.0	5	15.2	0	0.0	2	9.5
Shell	12	30.0	10	30.3	0	0.0	2	9.5
T.C.P.	0	0.0	0	0.0	8	47.1	0	0.0
Total	40	100.0	33	100.0	21	100.0	10	100.0

The majority of trainees is therefore concentrated in the area of the Foothills and Central Alberta between the two major cities of Edmonton and Calgary. The second largest concentration of northern trainees is in the Mackenzie Delta, where drilling operations take place. Table 6-4 shows the training locations by regions for continuing and terminated northern trainees.

Termination rates by location in Table 6-4 are not so much a reflection of the specific training site, but rather of the availability of certain types of technology in some regions and not in others. Although reasons for termination do reflect to some extent the socio-geographical milieu a trainee finds himself in, the variation of termination rates among the specific regions is primarily determined by the socio-technical system, a point that will be elaborated in the next section.

Table 6-4

Training Locations by Regions for Continuing and Terminated Trainees

Training Locations	Continuing		Terminated[a]		Total	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
Mackenzie	(20)	(26.0)	(20)	(58.7)	(40)	(36.0)
Inuvik	1	1.3	1	2.9	2	1.8
Tuktoyaktuk	2	2.6	1	2.9	3	2.7
Swimming Point	8	10.4	6	17.6	14	12.6
Bar-C	1	1.3	4	11.8	5	4.5
Farewell	5	6.5	7	20.6	12	10.8
Norman Wells	3	3.9	1	2.9	4	3.6
Foothills & Central Alberta	(23)	(31.1)	(10)	(29.3)	(33)	(42.9)
Valleyview	1	1.3	-	0.0	1	0.9
Swan Hills	4	5.2	1	2.9	5	4.5
Edson	1	1.3	-	0.0	1	0.9
Rimbey	2	2.6	1	2.9	3	2.7
Strachem	2	2.6	3	8.8	5	4.5
Rocky Mountain House	6	7.8	-	0.0	6	5.4
Innisfail	2	2.6	3	8.8	5	4.5
Harmattan	1	1.3	2	5.9	3	2.7
Carstairs	1	1.3	-	0.0	1	0.9
Jumping Pound	2	2.6	-	0.0	2	1.8
Turner Valley	1	1.3	-	0.0	1	0.9
Prairies	(14)	(18.2)	(3)	(8.8)	(17)	(15.3)
Hussar (Alberta)	3	3.9	3	8.8	6	5.4
Princess (Alberta)	3	3.9	-	0.0	3	2.7
Burstall (Saskatchewan)	4	5.2	-	0.0	4	3.6
Caron (Saskatchewan)	4	5.2	-	0.0	4	3.6
Cities	(20)	(26.0)	(1)	(2.9)	(21)	(18.9)
Edmonton	3	3.9	1	2.9	4	3.6
Calgary	17	22.1	-	0.0	17	15.3
Total	77	100.0	34	100.0	111	100.0

[a] Total percentage of terminees is 30.6 per cent.

Type of Technology and Training Occupations

Most of the trainees are or were in training for occupations as gas plant operators (23), gas transmission operators (20), or as roughnecks, motormen or derrickmen on drilling rigs (20). Fourteen trainees are or were in training for occupations such as heavy equipment operators, expeditors or material supervisors. Eleven are or were in training for technician jobs, and another 11 for specific trades. Ten are trained for clerical occupations, most of them as accounting clerks.

In terms of the occupation for which they were in training, the terminees are overrepresented in the drilling technology and underrepresented in the clerical group. Table 6-5 presents the training occupations according to the type of technology for both continuing and terminated trainees. These training occupations will be briefly described within the respective type of technology.

Continuous Process Technology. In gas plants, in which the natural mixture of crude oil, water, and sulphurous gases are separated to produce gas for the market, or in compressor stations that pump gas through pipes over large distances to the consumer, the operator's occupational task can best be described by using several terms under the umbrella concept of operation: to observe, maintain, check, run, adjust, react to, detect, isolate, start up and shut down equipment.[1] Since the automated process performs the production for him, the operator feels in

---

[1] All job descriptions are derived from the pamphlet for Northern Employment, distributed by the T.T.F..

Table 6-5

Training Occupations of Continuing and Terminated Trainees

Training Occupations by Type of Technology	Continuing		Terminated		Total	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
Continuous Process	(31)	(40.3)	(12)	(35.3)	(43)	(38.7)
Compressor Station Operator	16	20.8	4	11.8	20	18.0
Gas Plant Operator	15	19.5	8	23.5	23	20.7
Craft	(19)	(24.7)	(3)	(8.8)	(22)	(19.8)
Technician	11	14.3	-	0.0	11	9.9
Welder	2	2.6	-	0.0	2	1.8
Millwright	3	3.9	-	0.0	3	2.7
Electrician	1	1.3	1	2.9	2	1.8
Mechanic	2	2.6	2	5.9	4	3.6
Drilling	(17)	(22.1)	(19)	(56.0)	(36)	(32.4)
Roughneck	9	11.7	11	32.3	20	18.0
Equipment Operator	2	2.6	3	8.8	5	4.5
Material Supervisor	2	2.6	-	0.0	2	1.8
Clerk-Expeditor	3	3.9	4	11.8	7	6.3
Surveyor	1	1.3	1	2.9	2	1.8
Clerical	(10)	(13.0)	(-)	(0.0)	(10)	(9.0)
Clerical and Typist	2	2.6	-	0.0	2	1.8
Cost Analyst	1	1.3	-	0.0	1	0.9
Accounting Clerk	7	9.1	-	0.0	7	6.3
Total	77	100.0	34	100.0	111	100.0

control of the operation as long as it flows smoothly.

Besides having a great deal of control over his immediate work, the operator trainee also enjoys considerable physical mobility. He is at liberty to leave the control room and walk about the plant. During a period of smooth operation of plant or station, the work situation provides a relaxed atmosphere in which the trainee is quite free to choose his work pace.[2] This social climate is functional for training purposes and for the operation as a whole, because the control of the continuous process requires accuracy and responsibility as mistakes are very costly.

Training in such an atmosphere is facilitated by the interdependence of the work groups necessitating that knowledge and skills are willingly communicated to other operators and trainees. Blauner reports that

> . . . a number of workers mentioned their surprise at the readiness with which more experienced employees taught them their jobs and helped them with their problems - exclusiveness and withholding of skills and knowledge had been common in other industries (Blauner, 1967:146-147).

Craft Technology. The petroleum industry must provide for the maintenance and repairs of electronic and heavy equipment of its automated production machinery. The skilled maintenace and repair work, by its very nature, disallows a repetitive cycle of operations, except for the routine checking of equipment, in preventive maintenance. Taking apart machinery or instruments requires knowledge and skill not only of the specific piece of equipment, but also of its function as one part of the integrated larger system.

---

[2] Whilst interviewing trainees and work associates in gas plants and transmission stations, the relaxed atmosphere prevailing was a constant source of amazement to the interviewing team. It was always possible to interview an individual without obtaining a substitute for him while at work. Sometimes waiting was necessary until a worker had completed his round of instrument reading, but if he was found in the coffee room or office, he was never pressured to cut short the interview or find a "relief man".

Craft technology, as emphasized in Chapter 3, requires a balanced combination of motor skills combined with a commitment to the task, but also the use of frequent judgements and initiative; aspects of a job which give the worker a feeling of control over his environment. Complex tasks are assigned and it is considered to be the responsibility of the craftsman to complete them in reasonable time.

The relevant trades of the craft technology open to northern trainees are briefly described below.

The controls technician at a compressor station deals with the installation, servicing, and calibrating of electronic equipment, gauges and recorders. The computer maintenance technician's responsibility is to maintain and service the controls and electrical equipment of computers. The automation maintenance technician's responsibility is to maintain and service the instruments of the central control system including compression, measurement, automation, and auxiliary electrical equipment.

The instrument mechanic repairs and adjusts instruments of a plant or compressor station that work by either compressed air or electricity.

The electrician is responsible for installing, overhauling, and repairing electrical equipment such as switches, motors, and lighting. He tends all electrically-powered tools and equipment.

The millwright services, overhauls, and repairs all mechanical equipment used in oil refineries, gas plants, and compressor stations. His responsibility is to assure the proper functioning of the machinery, such as turbines, compressors, service heating and cooling equipment, and pumps.

The heavy equipment mechanic repairs, adjusts and rebuilds heavy equipment such as cranes, power shovels, scrapers, graders, gas diesel engines, and hydraulic systems.

The pipe construction welder has to know general welding skills employable for work on trucks and other equipment. However his speciality is high-pressure pipeline welding.

As maintenance and repair cannot be mechanized and scheduling of maintenance work is partly determined by what piece of equipment breaks down, the nature of the craft industry cannot be standardized. The work of the craftsman, therefore, is less repetitive than that of the operator, partly on account of the unpredictability of breakdowns, and partly because the performance of one task encompasses a variety of operations.

Generally, trainees in the craft technology have considerably more freedom of physical movement compared to trainees in other technologies. Frequently, they are called away from the shop to trouble spots or for routine checks in specific sections of plant or compressor station. Some trainees belong to work teams that have a converted truck as a mobile workshop at their disposal in order to serve several stations of the "field". Others are centrally stationed in a city and drive to specific locations when the need arises. Thus, their job does not only take them away from the work bench, but frequently away from a workshop altogether.

The recruitment and promotional system of the trainee learning a trade is modelled after the prevailing general pattern of apprenticeships as discussed in Chapter 3. Controls technicians usually have been trained as operators first, advancing from the internal rank and file. Other trainees entered the training program as apprentices for training in a specific trade.

Their different line of work and the internal promotional system ties the northern craftsman trainees to other craftsmen and separates them somewhat from the rest of the employees in any one location (including from other northern trainees).

Drilling Technology. The employment situation in the Mackenzie Delta differs in several respects from those discussed above. Trainees are employed in two types of settings: (1) on the actual drilling rigs and (2) in the camps which supply the drilling sites with equipment and other necessities.

Drilling operations in the North are removed from places of fixed habitation.[3] Although camp life provides the worker with comfortable living arrangements in barracks, most workers have to brave the sub-zero temperatures during the long winter months when drilling operations are at a peak. The worker's brief leisure time is usually spent watching colour television (with one northern CBC channel available), the odd movie, playing pool, or reading. The worker is usually confined physically to the camp site and to his place of work. The pay is very high compared to other occupations of similar skill levels in large part because more than half of a work rotation is spent in overtime work. However the high expense of clothing, telephone calls (not tax deductible), and other diverse expenditures due to absence from home for two-week periods, require a larger income to "break even".

---

[3] The crews are flown in on a rotation schedule involving 14 days of work and one week at home. This procedure requires three crews to perform one task. The work day is stretched to 12 hours each for two alternating crews, with the third crew having time off. Many of these workers express concern about their separation from family and community, worrying about them when away from home. They have problems maintaining contact with their families by mail, telephone, and because of weather-bound flight schedules. They miss family involvement at their place of work (Hobart, 1974:17).

It is not surprising that under these circumstances the turnover rate of both southern and native employees is extremely high in this technology. In the Mackenzie Delta the termination rate of trainees is over 55 per cent. This percentage still compares favourably with the findings of a report which showed that during the 1973-74 season 391 southerners were employed (at least for a brief period) when no more than 100 to 110 southern workers would have been necessary to man all positions above the roustabout or labourer level and below the foreman or toolpusher (Hobart, 1974:14). The figures in Hobart's report represent a termination rate of approximately 75 per cent within the same occupational categories of those of the northern trainees. Furthermore, when comparing southerners with the native population in regards to total weeks worked, there was found to be virtually no difference in terms of termination rates across ethnic groups. According to the study, over 36 per cent of the natives and over 39 per cent of the southerners (primarily recruited from Alberta) worked no more than four weeks, 39.8 per cent and 39.9 per cent respectively lasting up to 14 weeks. Only 23.7 per cent and 20 per cent respectively worked 15 weeks and more (Hobart, 1974:38).

Within the drilling technology various occupations are open to northern trainees. On-the-job training and advancement, so characteristic among operators and, to a certain extent among craftsmen, are also routine on the rig. A trainee starts as a roustabout or leasehand and performs odd jobs at the rig site ranging from washing equipment to mixing drilling mud. The roughneck works on the drilling floor, using big power wrenches to uncouple and screw together pipe lengths. The motorman operates the motors of the drilling rig. The derrickman helps to stack and position the pieces of drilling pipe. The driller supervises and assists the uncoupling and screwing together of pipes. At the top of this promotional hierarchy is the toolpusher, whose major responsibility is the supervision of the entire operation of the rig.

These short job descriptions indicate only the major tasks to be performed when the drilling rig is in operation. Clearly, they do not justice to the variety of jobs each worker actually carries out.[4]

Although the worker is confined to the drilling site, occasionally he enjoys considerable freedom. At times he works alone, controls his physical movements on the premises, and he has a great deal of control over his immediate work pace. During routine drilling the work situation produces a relaxed atmosphere in which the worker is fairly self-determinate in his work. At other times, however, he is under high pressure to perform. During "tripping" the exchange of pipes has to be achieved as quickly as possible so that drilling may continue. For this reason, when a bit is to be checked or exchanged, drilling crews work without interruption, merely taking time to stop for meals on the drilling floor. Under extreme weather conditions, however, occasional short breaks have to be introduced.

In emergencies, the drilling operations are similar to those of the continuous process technology. Problems of breakdown on the drilling site or of an oil or gas "blow out" have to be anticipated. At times of crisis all manpower is needed to avoid a major catastrophy. These situations require immediate and accurate responses on part of the crew members. Whereas the continuous process operator does not feel responsible for a breakdown of the equipment or a crisis, the worker on the drilling site is partly responsible for it, as one aspect of his job is to maintain machinery and take precautions to avoid "blow outs".

---

[4] These additional tasks are described in Chapter 3, page 34.

The heavy equipment operator operates a variety of heavy construction machines. He must be able to operate light vehicles, medium body trucks, bed trucks, tractor trailer trucks, track-type vehicles, loaders, crawler tractors, graders, wheel-type dozer and snow blowers. He often performs service tasks such as cleaning, refueling, and lubricating. He may be asked to adjust clutches, brakes, tracks and other parts of the machine and assists the heavy duty mechanic in repairs. These employees are the most physically mobile group on the camp sites. Their work takes them away from the more protected areas onto the Arctic tundra and ice under all kinds of weather conditions.

The material expeditor works primarily indoors and his duties are similar to those of the material supervisor. He operates vehicles on the camp site, expedites material, utilizes the communication system, and also performs clerical duties. He enjoys some degree of physical mobility and can usually work at his own pace. Generally, he has the greatest flexibility of all workers in the drilling operations.

Clerical Technology. Clerical technology is distinct from the other three types by one major criteria: the clerical employee does not repair and/or maintain machinery and equipment used for producing consumer goods. It is therefore the farthest removed from all other types of technology.

Within the Northern Training Program the following clerical occupations have been made available to northerners: accounting clerk, typist and secretary, office clerk, and cost analyst.

The major task of the accounting clerk is to process invoices and maintain accounting records. The cost analyst analyses accounting data and prepares accounting reports. The office clerk handles mail, operates office equipment including telex and TWX. The secretary-stenographer develops and maintains filing systems, financial records, and of course uses shorthand and operates typewriters for correspondence.

✓ The presence of seven females in this technology introduces a different evaluative structure. Comparison with the other types of technology is therefore to be made with caution, and generalizations must be avoided. Therefore, although clerical technology is employed to test the hypotheses about the evaluative orientation of the trainee and his/her work associates in Chapter 7, the factual content of the evaluation of the trainee and his/her work associates will not be analysed in Chapter 8.

Reasons for Termination

As of September 1974, 77 trainees were still in the program. Thirty-four trainees had terminated since 1973. Table 6-6 sets out the reasons for termination given and the number of terminees to whom they applied.

Reasons for termination appear to differ according to type of technology and according to employment region, the former being regionally bound within the training program's context. In the drilling

Table 6-6

Reasons for Termination and Number of Terminees to whom each Applied

Reason	Number	Per Cent
Unreliable work habits	10	29.4
Drinking problem	4	11.8
No interest in the occupation	5	14.7
Found better job	2	5.9
Lonesome, homesick	5	14.7
Personality problem	3	8.8
Family and/or financial problem	4	11.8
No reason recorded for termination	1	2.9
Total	34	100.0

technology, reasons for the highest number of terminees (55%) have been given as having unreliable work habits (e.g. not returning to the shifts) or drinking problems. Loneliness, financial and family problems are given as reasons for termination by only 16.7 per cent. Among terminees in the continuous process technology, the percentage for reasons given is reversed: loneliness, financial and family problems account for 61.5 per cent, whereas unreliable work habits and drinking problems account for 23.1 per cent. In the craft technology, one terminee was dismissed because of unreliable work habits, another left the program because of loneliness, and a third (in the drilling operations) did not return to the shift. No trainee of the clerical technology has so far terminated.

Termination rates, then, are highest in the drilling technology, followed by continuous process production. Reasons for termination given differ among different types of technology.

Summary

Northern trainees have been relocated in 1971-74 mainly to south-west Canada, or they are flown to the Mackenzie Delta drilling sites on a two-week in, one-week out basis, for the purpose of on-the-job training for semi-skilled, skilled and clerical occupations in the petroleum industry.

The locations of the training sites are determined partly by the availability of regional operations of participating companies and partly by the companies' decision to select sites that are considered to be most congenial for the training of northerners.

The training occupations available to northerners have been described within the socio-technical systems theory. Accordingly, these occupations have been located within one of the types of technology of the petroleum industry: continuous process, craft, drilling, and clerical technology.

Termination rates may be viewed as being a reflection of three factors: first, the different times of entry into the program by the trainees; second, the different periods at which specific types of technology were opened to the trainees; and third, the emphasis which has been placed on the type of technology. In general, drilling technology has the highest termination rate, followed by continuous process technology and craft technology. Clerical technology recorded no terminees. The reason for termination given for each trainee differs among types of technology: In drilling technology unreliable work habits (not returning to the job site) and drinking problem are predominant, whereas in continuous process and craft technology loneliness, and personal and family problems rank highest.

Chapter 7

THE SOCIO-TECHNICAL SYSTEM AND THE ACTOR'S EVALUATIVE ORIENTATION

This chapter addresses itself to the major research question as originally formulated in Chapter 1 and further developed in Chapters 3 and 4 . The northern trainee who has entered the training program evaluates the company and his work associates in terms of his past and present experience. The work associate of the trainee also evaluates the trainee in terms of his past and present experience. The socio-technical system of the petroleum industry, however, places various constraints on all actors in defining their action world. Hypotheses I assert that the actor within an industrial setting differentiates between competence, normativeness, and integration in evaluating alters. Hypotheses II state that the different types of technology within the petroleum industry introduce a degeneration of differentiation in some but not in other types of technology.

To test these hypotheses, factor analysis is considered as a method particularly suited for conceptual and theoretical inductive generalization. Therefore, questions that serve for each component concept are selected from the data, and the responses thereto factor analysed. Factor analysis as a method establishes empirical relations between these questions or items. Principle factor solution with orthogonal varimax rotation is used as the method, with the selection of three factors. Items with loadings above ±.4 are considered as contributing to the interpretation of that factor. The resulting factors are interpreted as constructs, embodying the pattern of interrelationships as defined by those factors. Therefore the resulting constructs categorize the conceptual characteristics of the factor results.

For a better visual presentation and display of factor saturation, all loadings below ±.4 are omitted in the tables to follow. Furthermore, the component concepts are re-organized according to their theoretical elaboration in Chapter 3, rather than presented in the original variable order technique or in the loading order technique. Correlation coefficients are given in Tables 2 to 4 in Appendix B.

THE TRAINEE'S EVALUATIVE ORIENTATION

Data are only available for trainees in the program at the time of interview gathering. Therefore, the following analysis and discussion is based on 72 cases. Twelve items, conceptually representative of the three constructs, were factor analysed.

Trainee's Evaluative Orientation as a Group

The relevant hypothesis derived from Proposition I (1) is:

Hypothesis I (1): Evaluative items of trainees entered in factorial analysis will separate into three identifyable factors that can be interpreted as competence, normativeness, and integration.

Factor 1: Integration. With an eigenvalue of 2.72 the integration factor accounts for 22.6 per cent of the total variance and 42.4 per cent of the explained variance. It includes all items pertaining to the relationship of the trainee with his work group. All of the four items are well above the minimum cut-off point of ±.4, but internal differentiation is important to warrant some discussion (Table 7-1).

Table 7-1

Factor Structure of Trainee's Evaluative Orientation by Integration, Competence, and Normativeness

Item[a]	Integration	Competence	Normativeness[b]	h^2
Competence				
Facility(-ties)		0.67708		0.46475
Cooperation		0.61396		0.37882
Disposal		0.54494		0.30341
Sanctions		0.77400		0.62572
Normativeness				
Privilege			0.58013	0.35364
Loyalty(-ties)			0,76877	0.59811
Authority			0.55233	0.35760
Responsibility			0.62303	0.40073
Integration				
Occasions	0.75351			0.60977
Symbolization	0.64589			0.43989
Receptiveness	0.88159			0.79896
Representation	0.46817			0.22562
Eigenvalue	2.71616	2.36851	1.96741	
Percentage of Variance	22.6	19.7	16.4	
Cumulative Percentage	22.6	42.4	58.8	
Number of Respondents	72			

---

[a] These twelve variables have been selected on the principle of one-to-one mapping from the component concepts to indicators. Indicators were selected by the criterion of face-validity.

[b] All loadings of these factors are given in Table 5, Appendix B. The factor loadings for four factors are given in Table 5a, Appendix B.

The highest loading (as well as communality) is found to be on the item asking whether or not the trainee feels that the co-workers are considerate and helpful (Receptiveness). Squaring the loading of 0.88 determines the relative weight this variable should have in interpreting a factor. The lowest loading is found on the item asking whether or not the trainee feels accepted by the work group (Representation). Whether or not the work group is indifferent to the trainee's presence (Occasions), and whether or not he finds his co-workers friendly (Symbolization) show loadings of .7 and .6 respectively. All other items entered into factorial analysis have loadings below the acceptable standard on this factor - therefore no contribution to the interpretation of this factor is attributed to them.

The concept of integration within the work organization has been the subject of several studies (Blauner, 1967:146-148; Fullan, 1970:354). In these studies, however, work integration is indirectly explained by structural features of the work group, such as size of work group, team or individual production, and independent work performance of work group with a minimum of supervision. In addition, some subjective questions are used - number of contacts and availability of time for informal chats. The second set of questions taps to a certain extent the construct of integration employed in this research better than does the former, but still provides, to my opinion, at best the 'occasions' dimension (Blauner, 1967; Fullan, 1970). Structural conduciveness for integration is a necessary, but not sufficient condition for integration. Workers may be physically close and work together but still not feel integrated, if integration is subjectively defined as a measure of the actor's expressive system.

Factor 2: Competence. Factor 2 explains 19.7 per cent of the total variance and 30.7 per cent of the explained variance, with an eigenvalue of 2.4 (Table 7-1). Items loading above ±.4 on this factor relate to the evaluation of the trainee with regard to the competence of the employing company. "Sanctions', in the form of wages and fringe benefits, loads highest, whereas the trainee's willingness to stay in the program (Disposal) has the lowest acceptable loading on that factor. Additional items contributing to the interpretation of the competence factor are the trainee's satisfaction or dissatisfaction with regard to the working conditions (Facilities) and the cooperation given by the company in the training program (Cooperation). Some of the items included in this construct are generally referred to in the sociological literature as extrinsic job satisfaction, the factual content of which will be dealt with in the next chapter.

Factor 3: Normativeness. Normativeness is the third important factor, explaining 16.4 per cent of the total variance with an eigenvalue of 1.96. Items with acceptable or high loadings on this factor are those dealing with the trainee's relationship with the first-line supervisor on a formal, rather than informal level. The question about the supervisor's patience with the trainee has served as an indicator for 'Privilege'. The highest loading in this factor (.7), however, is found to be on the item asking the trainee how he gets along with his supervisor (Loyalty,-ties), followed by the item asking whether or not the supervisor spends more time with the trainee than with other workers (Responsibility). The question asking whether or not the supervisor asks or invites questions or orders the trainee to do jobs (Authority) explains least of the total variance of the normativeness factor. Table 7-1 shows that the items with high loadings reflect on the whole what the trainee considers to be legitimate.

Conclusion. The above findings show that separate items entered into factor analysis cluster into three factors that can be interpreted as integration, competence, and normativeness according to the meaning of those items. Integration, the most important of the factors, explains the relation between trainee and co-worker for the expressive system. Competence defines the trainee's relation with the company for the pragmatic system. Finally, normativeness is formally defined by items of the ethical system. Therefore, the above hypothesis is supported.

Trainee's Evaluative Orientation by Type of Technology

Having examined the trainee's evaluative orientation as a group in the previous section, the same data are separately factor analysed according to type of technology.

The same conventional procedure is used in explaining the percentage of variance of a factor as the importance of the construct as compared to the others, the positive or negative loadings of items in a specific factor as contributing to that construct, and the squared loading as the relative weight the item has in the interpretation of that particular factor.

The relevant hypothesis to be tested, as stated in Chapter 4, is as follows:

> Hypothesis II (1): Evaluative items of trainees employed in continuous process, craft, drilling and clerical technology will fall into the conceptual pattern in decreasing order.

Continuous Process Technology. As shown in Table 7-2, the entered items of the continuous process operators separate clearly into three factors. These factors explain 61.5 per cent of the total variance. Compared to the results in Table 7-1, most of the variance (24.6%) is explained by the competence factor rather than by the integration factor. The normative factor has remained in third position, explaining 17.2 per cent of the variance. In general then, with the exception of the shift of factors, continuous process operators follow the pattern presented in Table 7-1.

In the continuous process technology, training is carried out on the job and advancement is fairly common. The worker must therefore depend upon the specific employing company for his training and promotions. The trainee's decision to stay in the training program, the wages and benefits he receives, and the working conditions prevailing are a legitimate concern to him. Therefore, I conclude, that to the operator-trainee the evaluation of what the company offers forms the most important criteria in evaluating his work situation.

Integration into the work force is of second importance, as most training, co-ordinating and supervisory functions fall to the head shift operator rather than the supervisor. The co-worker is in a similar position to that of the trainee (he is distinguished only by a number after his occupational title), hence his guidance is not felt as being formal. The co-workers are considered by the trainee as significant others during the training process as well as during those working hours when he is not involved in instrumental tasks. Even in time of emergency he usually depends on the work group rather than on the supervisor,

Table 7-2

Factor Structure of Trainee's Evaluative Orientation in Continuous Process Technology

Item	Competence	Integration	Normativeness	h^2
Competence				
Facility(-ties)	0.66108			0.47573
Cooperation	0.59523			0.37531
Disposal	0.53221			0.36870
Sanctions	0.94984			0.98026
Normativeness				
Privilege			0.42006	0.17937
Loyalty(-ties)			0.81323	0.66634
Authority			0.62801	0.45395
Responsibility			0.55424	0.31998
Integration				
Occasions		0.78197		0.64640
Symbolization		0.53819		0.34193
Receptiveness		0.74464		0.66577
Representation		0.75877		0.61142
Eigenvalue	2.95275	2.36293	2.05890	
Percentage of Variance	24.6	19.7	17.2	
Cumulative Percentage	24.6	44.3	61.5	
Number of Respondents	27			

especially at smaller transmission stations where the sub-foreman may not be at the site at all times. It becomes quite clear, that through this elaborate system of ranks below the supervisor level, the latter becomes less important to the trainee than the work group.

Craft Technology. Table 7-3 presents the factor structure and factor pattern of this group. As craft trainees are employed under similar circumstances, the items cluster into the same three factors as those of the continuous process operators. In all, these three factors explain 69.1 per cent of the total variance.

The order of the factors describing a particular construct has changed, however. Integration becomes very important to the craftsman as he is likely to work in pairs or trios. This factor explains 30.1 per cent of the variance.

The normative factor has shifted into second position, explaining 23.1 per cent of the total variance. The importance of normativeness can be interpreted in terms of the closer relation between trainee and supervisor on the formal level than the operators have indicated. The supervisor is the one who represents the institutionalization of the trade. This interpretation concurs with findings in the literature on craft technology, namely that through apprenticeship strong identification with the trade rather than with the employing company occurs (Blauner, 1967:47). The supervisor, then, represents an authority figure and link between the trainee and the trade of which they are a part. It should be pointed out that craftsmen have higher loadings on all items on the normative factor, whereas among operators loyalty(-ties) explains most of the factor's variance.

Table 7-3

Factor Structure of Trainee's Evaluative Orientation in Craft Technology

Item	Integration	Normativeness	Competence	h^2
Competence				
Facility(-ties)			0.61506	0.40712
Cooperation			0.84134	0.75825
Disposal			0.62419	0.39548
Sanctions			0.67874	0.51194
Normativeness				
Privilege		0.76408		0.65112
Loyalty(-ties)		0.73955		0.54834
Authority		0.78315		0.62045
Responsibility		0.61961		0.41346
Integration				
Occasions	0.87659			0.84282
Symbolization	0.90820			0.90167
Receptiveness	0.94759			0.89988
Representation	0.48309			0.26929
Eigenvalue	3.61382	2.77726	1.89511	
Percentage of Variance	30.1	23.1	15.8	
Cumulative Percentage	30.1	53.3	69.1	
Number of Respondents	21			

Craftsmen put the competence of the employing company last in their evaluation. Within that factor not sanctions, but cooperation shows the highest loading: This finding agrees with previous studies, inasmuch as craftsmen are not so dependent upon internal promotions and wages, as unions determine the latter and promotions are less significant - they are always free to leave the company and find employment elsewhere. Operators, generally, do not have such freedom.

Drilling Technology. Items of trainees in the drilling technology (camp and drilling sites) present a quite different factor structure and factor pattern than the previously discussed groups (Table 7-4). In Chapter 3 the idea was advanced that the operations in the North, especially those on the drilling floor, require a team effort. The prediction that trainees employed in drilling technology do not make as clear a separation between the constructs as do those in the continuous process production, is supported by some of the crossloadings on all three factors. However, the constructs named normativeness and integration are discernable with the third factor labelled as cooperation.

Most of the variance is explained by the integration factor. The item of representation has become irrelevant, whereas the item of authority and that of facility(-ties) shows a relationship to integration. This finding requires further interpretation.

In the northern drilling operations, it seems to be less relevant whether or not the trainee feels accepted by the work group. His evaluation of integration is primarily determined by whether or not the co-workers show interest in him (occasions) and are receptive to his needs within the working context (receptiveness). The emphasis on integration can be linked

Table 7-4

Factor Structure of Trainee's Evaluative Orientation in Drilling Technology

Item	Integration	Normativeness	Cooperation	h^2
Competence				
Facility(-ties)	0.44046			0.22360
Cooperation			0.83978	0.75473
Disposal		(-0.89916)		0.85937
Sanctions				0.02961
Normativeness				
Privilege		0.42307	(-0.81070)	0.84949
Loyalty(-ties)		0.74945		0.61870
Authority	0.63407			0.51911
Responsibility		0.74683		0.58490
Integration				
Occasions	0.82563			0.71006
Symbolization	0.79589			0.68546
Receptiveness	0.86171			0.85643
Representation				0.09184
Eigenvalue	3.26999	3.02705	1.53862	
Percentage of Variance	27.3	25.2	12.8	
Cumulative Percentage	27.3	52.5	65.3	
Number of Respondents	14			

to the specific type of technology. Failure on the part of one team member to perform creates problems for the entire team. If one worker does not show up for work, again team work suffers as even a competent replacement creates adjustment problems. Integration seems to assume the connotation of "work integration" rather than the specific meaning attributed in the theory of evaluative orientation.

In this trend of thought, the item of authority gains significance if the supervisor is considered as one of the work team. Authority taps the issue of whether the supervisor invites questions, explains, or tells the trainee what to do. If the supervisor is considered as being part of the team, instructing but at the same time performing a task, the similarity between the supervisor in the drilling technology and the co-worker in the continuous process technology is striking. The senior operators are also part of the work group and integration exists between those who train and the trainee. In the drilling operations, on the structural level the supervisor is separated, but in the actual operation he becomes also part of the work team. This explanation is tentative, as the data are not available for testing different informal levels of common task performance.

The low, but yet present loading on the item 'facilities', also requires explanation. It is argued that in the drilling technology it is the work team, and not so much the employing company (and indirectly the technology), that provides the working conditions for the trainee. This is an important finding, although the correlation is not very high.

Factor 2 can still be labelled as normativeness, as three items comply with the theoretical conceptualization. Its negative high loading on the item of disposal indicates that normativeness has definitely no relation with what the trainee offers on the pragmatic system's level. The factor's bipolarity is best expressed by its moderate ratio of items on normativeness and its low ratio on items of competence and integration. Normativeness is primarily explained by the items of loyalty(-ties) and responsibility. Privilege and authority have low loadings on this factor. Indeed, as predicted, integration and normativeness are not entirely statistically independent.

To label the third factor as competence would be misleading. Therefore, the label of the item that loads high on this factor, namely cooperation, is used. The communality of sanctions (the fourth component concept of competence) is less than point zero, and in fact would constitute a separate factor if four, rather than three factors were asked. It still would explain 12 per cent of the total variance.

Clerical Technology. As predicted, the general pattern among clerical trainees is least visible (Table 7-5). First of all, the items do not load according to conceptualization. Secondly, several cross-loadings exist, which points to the fact that the three factors are not statistically independent. Two factors appear to be adequate in explaining most of the variances. Thirdly, three of the communalities are low. These findings do support the hypothesis insofar as degeneration of the factor structure has occured. Though these three factors explain 67.6 per cent of the total variance, they cannot be interpreted as competence, normativeness, and integration.

Factor 1 represents a mixture of competence items with authority on the normative dimension and symbolization on the integrative dimension. Conceptually, three out of the four items measure a new construct that

Table 7-5

Factor Structure of Trainee's Evaluative Orientation in Clerical Technology

Item	Factor 1	Factor 2	Factor 3	h^2
Competence				
Facility(-ties)			0.94771	0.91300
Cooperation				0.14955
Disposal	0.74185			0.56092
Sanctions	0.58444		0.71634	0.89497
Normativeness				
Privilege		0.89741		0.82721
Loyalty(-ties)		0.75480		0.71107
Authority	0.84363			0.79223
Responsibility		0.55911		0.35452
Integration				
Occasions				0.14969
Symbolization	0.51149	0.63167	(-0.44606)	0.85960
Receptiveness	(-0.41535)	0.85519		0.92321
Representation				0.18673
Eigenvalue	3.62404	2.74842	1.73533	
Percentage of Variance	30.2	22.9	14.5	
Cumulative Percentage	30.2	53.1	67.6	
Number of Respondents	10			

cannot be easily interpreted. On the pragmatic and institutional level it deals with the object of exchange, but also includes 'symbolization' (a concept describing the mechanism of exchange) on the expressive level. It is therefore concluded that the questions directed towards the clerical trainees have elicited different meanings than they did from the other three groups.

Factor 2 combines objects of exchange on the expressive level with mechanism of exchange on the ethical level. Again, it is difficult to interpret this factor, as 'responsibility' also shows a moderate loading. At best, it may be called the integrative-normative factor.

Factor 3, although only two items load high, cannot be defined as 'competence'. It is statistically not an independent factor, as 'sanctions' shows loadings on both the first and the third factor. Since the first and second factors show also crossloadings on the symbolization item, they are also statistically interdependent.

These results should not be interpreted in such a way as to conclude that clerical trainees cannot make the separation between the three systems. Rather, it is possible that the specific questions asked do not produce the relevant distinctions between the three systems within an office situation.

Conclusion. The above findings demonstrate a degenerative process of the factor structure when continuous process, craft, drilling, and clerical technologies are separately analysed. Responses to items of trainees employed in the process production operations (i.e. operators, technicians, craftsmen) separate into the three predicted factors. Trainees in the drilling technology deviate somewhat from the conceptual scheme and those employed in clerical technology deviate to such an extent that factors cannot be easily interpreted. Hypothesis II (1) is therefore supported.

THE CO-WORKER'S EVALUATIVE ORIENTATION

This section of the chapter deals with the co-worker's evaluative orientation of the northern trainee. Data for 61 co-workers of 83 trainees are available for the following analysis. At the time of interviewing, three trainees had no co-worker but were under apprenticeship of one supervisor. The other trainees for which no data are available are terminees of drilling sites in the Delta region, where the rate of transfer and turnover of manpower is extremely high; drilling rig crews are not permanent employees, typically. As in the case with the trainees, 12 indicators conceptually representative of the component concepts are factor analysed.

The Co-Worker's Evaluative Orientation as a Group

The relevant hypothesis, derived from Proposition I (2) is as follows:

> Hypothesis I (2): Evaluative items of co-workers entered in factorial analysis will separate into three identifyable factors that can be interpreted as competence, normativeness, and integration.

Table 7-6 delineates the general factor structure and factor patterns for the co-workers. In the order of variance explained, the most important factor is interpreted as normativeness, the second as competence, and the third as integration.

Factor 1: Normativeness. With an eigenvalue of 5.33 the

Table 7-6

Factor Structure of Co-worker's Evaluative Orientation by Normativeness, Competence, and Integration

Item[a]	Normativeness	Competence	Integration[b]	h^2
Competence				
Facility(-ties)		0.75408		0.63957
Cooperation		0.77551		0.70424
Disposal		0.64673		0.45866
Sanctions		0.81600		0.73749
Normativeness				
Privilege	0.78525			0.63912
Loyalty(-ties)	0.83893			0.76126
Authority	0.81887			0.81316
Responsibility	0.82058			0.78605
Integration				
Occasions			0.42818	0.20844
Symbolization			0.72051	0.56710
Receptiveness			0.69283	0.62740
Representation			0.90208	0.89999
Eigenvalue	5.32735	1.99722	1.49621	
Percentage of Variance	44.4	16.6	12.5	
Cumulative Percentage	44.4	61.0	73.5	
Number of Respondents	83			

[a] These twelve variables have been selected on the principle of one-to-one mapping from component concepts to indicators. Indicators were selected by the criterion of face-validity.

[b] All loadings of these factors are given in Table 6, Appendix B. The factor loadings for four factors are given in Table 6a, Appendix B.

normativeness factor accounts for 44.4 per cent of the variance. This high eigenvalue as well as the variance explained indicate that factor 1 does present the most important dimension of all three constructs, partially because all other items do somewhat contribute to that factor as well. Although their loadings are small, they do not center around point zero. Four items have 0.1, two items load 0.2 and one item loads 0.3. However, the items that are presented in Table 7-6 do show significant communalities and loadings. All four items are well above the minimum cut-off point of ±.4, and in addition, the internal differentiation is considered to be small.

The question on whether the co-worker prefers the trainee's company over working alone has the lowest loading. It is the indicator for the 'privilege' the trainee provides for the co-worker in the ethical dimension. The items of loyalty, authority, and responsibility have similar loadings, and the questions related to these items are adequate indicators of these component concepts.

Factor 2: Competence. Factor 2 explains 16.6 per cent of the total variance with an eigenvalue of 2.0 (Table 7-6). Items loading above ±.4 on this factor relate to the evaluation of the co-worker with regard to the competence of the trainee. Again, there are some low loadings on the other items, with the exception of a negative loading on 'occasions'. Competence, then, has some relations with normativeness and integration in general, but whether the trainee is outgoing or shy is entirely irrelevant to his competence to co-workers when they are considered as a group. The questions about the trainee's working skill (Sanctions) loads highest, whereas the question whether or not the co-worker has to work harder on account of the trainee's presence (Disposal) loads lowest.

The ability of the trainee to learn, as evaluated by the co-worker, is used as an indicator for facility. The trainee provides the 'potential' of performing; thus it is viewed as a characteristic that he cannot easily change. The ability to learn is regarded as one mechanism of social exchange.

The question relating to the trainee's level of engagement in work is used as an indicator for cooperation. With the co-worker being in a position similar to that of the trainee, it was felt that this question taps the item adequately. In fact, to ask whether or not the trainee is cooperative, might have created confusion in the mind of the co-worker with the question of "Is the trainee considerate?". With a 0.78 loading on the competence factor, this item significantly contributed to the interpretation of the factor as competence.

Factor 3: Integration. Items with acceptable or high loadings on this factor are those conceptually related to the construct of integration. The factor, with an eigenvalue of 1.5, explains 12.5 per cent of the total variance, with no loadings higher than 0.1 on the other items.

As elaborated in Chapter 3 as well as in this chapter in the trainee's section, integration into the work force has been the subject of several studies. The indicators that have been used to measure the items on integration refer to how the co-worker finds the trainee: shy, friendly, considerate, acceptable (Occasions, Symbolization, Receptiveness, Representation - in that order). Occasions - whether the trainee is considered to be outgoing or shy - has the lowest loading. This dimension, then, contributes least to this factor. Additional comments gathered during interviewing make this finding more significant, as co-workers do not necessarily equate shy or outgoing behaviour with friendliness and/or consideration. Furthermore, negative comments were made about some trainees who were considered to be too outgoing ("loudmouth"), 'Symbolization' (friendliness) and 'receptiveness' (considerate) load higher than 'occasions'. The question of whether or not the trainee is accepted by the work group explains .82 per cent of the integration factor. Thus, friendliness and consideration on part of the trainee appear to be important characteristics contributing to the acceptance of the trainee by the co-worker, whereas the outgoing-shyness dimension seems to be less relevant.

Conclusion. From the above discussion it is concluded that the items of co-workers discriminate according to competence, normativeness, and integration. Some interrelations exist between these derived factors, but the loadings contributing to a particular factor are significantly higher than those which do not. Therefore, Hypothesis I (2) is supported.

It is interesting to note that integration is considered as the least important factor among the trainee's co-workers. Primarily, this result may be tentatively explained by the fact that many co-workers are actually involved in the training and supervision of the trainee. As the co-worker becomes responsible not only for the training but also partly for the mistakes the trainee might make, his evaluation of the trainee naturally focuses first of all on the ethical system. The trainee's competence, though not unimportant, receives second rank in importance. This result may not be generalized to other work groups as the training program imposes specific conditions upon the co-worker which may not exist in other situations within the petroleum industry, or not at all in other industries.

Co-Worker's Evaluative Orientation by Type of Technology

The relevant hypothesis, stated in Chapter 4, is reiterated.

> Hypothesis II (2): Evaluative items of co-workers employed in continuous process, craft, drilling, and clerical technology will fall into the conceptual pattern in decreasing order.

Continuous Process Technology. Table 7-7 presents the factor structure for the co-workers in the continuous process technology. These factors are basically the same as those of the entire group, and deviation from the former is found only in specific loadings. In all, they explain 75.4 per cent of the total variance.

Factor 1, normativeness, has an eigenvalue of 5.76 and by itself explains 48.0 per cent of the total variance. The second factor's eigenvalue is 2.0, still explaining 17.1 per cent of the variance. The third factor, integration, explains 10.3 per cent of the variance with an eigenvalue of 1.23. These findings require no further elaboration, as they are close to the general group and confirm the prediction.

Craft Technology. In Table 7-8 the responses of co-workers show some deviation from the general pattern, and from the patterns characterizing the continuous process technology. Although one can discern three distinct factors which can be interpreted as normativeness, competence, and integration, and the order of their importance has

Table 7-7

Factor Structure of Co-Worker's Evaluative Orientation in Continuous Process Technology

Item	Normativeness	Competence	Integration	h^2
Competence				
Facility(-ties)		0.70141		0.61205
Cooperation		0.86162		0.81119
Disposal		0.57049		0.45604
Sanctions		0.77020		0.72576
Normativeness				
Privilege	0.74611			0.59465
Loyalty(-ties)	0.81850			0.73915
Authority	0.87276			0.93161
Responsibility	0.72699			0.70604
Integration				
Occasions			0.46462	0.29939
Symbolization			0.88480	0.82806
Receptiveness			0.63230	0.65027
Representation			0.82260	0.79412
Eigenvalue	5.75745	2.05569	1.23202	
Percentage of Variance	48.0	17.1	10.3	
Cumulative Percentage	48.0	65.1	75.4	
Number of Respondents	39			

Table 7-8

Factor Structure of Co-Worker's Evaluative Orientation in Craft Technology

Item	Normativeness	Competence	Integration	h^2
Competence				
Facility(-ties)		0.71874		0.62512
Cooperation	0.50153	0.55903		0.56427
Disposal		0.64620		0.47280
Sanctions		0.89914		0.93920
Normativeness				
Privilege	0.79785			0.64131
Loyalty(-ties)	0.93438			0.90419
Authority	0.89165			0.82228
Responsibility	0.89069			0.89400
Integration				
Occasions		0.59122		0.41957
Symbolization			0.93555	0.89875
Receptiveness			0.85644	0.73474
Representation			0.86241	0.74474
Eigenvalue	4.81709	2.71183	1.89906	
Percentage of Variance	40.1	22.5	15.8	
Cumulative Percentage	40.1	62.7	78.6	
Number of Respondents	19			

remained, the eigenvalues and percentage of variance have somewhat converged. Thus, the normativeness factor explains less of the variance as compared to continuous process technology, but the competence factor explains somewhat more. The percentage of variance explained by the integration factor has risen slightly. These findings support to some extent the assumption that craftsmen place more emphasis on the competence factor than do continuous process operators.

Within the normativeness factor, 'loyalty' shows the highest correlation (.83), followed by 'authority', 'responsibility', and 'privilege'. All four items have insignificant loadings on the other two factors.

Better support for the hypothesis, however, is seen in the degeneration of the factor structure as explained by crossloadings. THe item of cooperation loads on the competence as well as on the normativeness factor, thus confirming the assumption that the two factors are not statistically independent. It was assumed that craftsmen are less capable of differentiating between the competence and normativeness factors because of their apprenticeship training and their relation to work. As their job requires both a relatively high level of manual skill as well as ethical codes of their trade, the distinction between the evaluative systems should be less clear, but the difference between the integration factor and the competence and normativeness factors should be more distinct. The loadings in Table 7-8 confirm this aspect of the hypothesis with the exception of one item, which will be discussed subsequently.

Items that have high loadings on the integration factor have near zero or negative loadings on the normativeness factor. They do, however, load moderately on the competence factor, with the item of occasions loading adequately high enough to warrant a possible explanation. The outgoing-shy dimension does correlate with the competence factor (though not on the integration factor) indicating that this dimension is considered by the craftsmen as 'facility' for the performance of a job rather than as 'occasions' serving for integration. As it stands, the integration factor, consisting of three rather than four items, is statistically independent from the others as the item of occasions does not show a crossloading.

In summary, co-workers in the craft technology do separate items entered into factorial analysis into three expected factors, but the item of cooperation shows a crossloading, and the outgoing-shyness dimension has to be interpreted as a second indicator for 'facility'.

Drilling Technology. The responses of co-workers entered into factorial analysis follow the same pattern as those of trainees employed in the drilling technology (Table 7-9). The separation of the items becomes less clear, the factors more difficult to define, and crossloadings indicate that two factors may be quite sufficient in explaining most of the variance. Three factors explain 74.9 per cent of the total variance. But factor 1 alone explains 46.5 per cent of the total variance with an eigenvalue of 5.57. The eigenvalue of the second factor drops to 1.81.

Factor 1 can be defined as normativeness as in the other technologies, with a low additional loading on the item of representation. I interpret this additional loading of representation as the item assuming an ethical connotation.

Table 7-9

Factor Structure of Co-Worker's Evaluative Orientation in Drilling Technology

Item	Normativeness	Competence	Integration	h^2
Competence				
Facility(-ties)		0.68209		0.53806
Cooperation		0.77068		0.73195
Disposal		0.56791		0.36442
Sanctions		0.83724		0.79499
Normativeness				
Privilege	0.87671			0.77826
Loyalty(-ties)	0.84088			0.85950
Authority	0.68753	0.45020		0.67541
Responsibility	0.87463			0.93275
Integration				
Occasions			0.51589	0.35839
Symbolization		0.49911		0.25703
Receptiveness		0.45303	0.88553	0.99191
Representation	0.44232	0.43223	0.71734	0.89704
Eigenvalue	5.57581	1.81070	1.60376	
Percentage of Variance	46.5	15.1	13.4	
Cumulative Percentage	46.5	61.5	74.9	
Number of Respondents	15			

Factor 2 can be defined in general terms as competence, although several items of integration and one item of normativeness load as well.

The integration factor shows crossloadings with normativeness on the item of representation, and crossloadings with competence on both items of representation and receptiveness.

Although the first two factors are conceptually complete, crossloadings indicate that they are not statistically independent. Crossloadings on items of the third factor indicate interdependence as well. These findings ~~confirm part of~~ the hypothesis that in drilling technology the separation between the constructs becomes less clear, explained in the previous section by the fact that team work blurs that distinction between the three systems of orientation.

To strengthen this argument, a new two factor analysis is substituted for the three factor analysis in Table 7-9a. Two factors still explain 61.5 per cent of the total variance. Factor 1 may be defined as the normativeness-integration dimension. Factor 2 can rightly be referred to as competence, whereby the item of authority shows a crossloading, and 'symbolization' significantly contributes to that factor as well. 'Occasions' does not load significantly in either factor. In the drilling technology, I therefore conclude, that normativeness and integration are least distinguishable from each other, and that competence is not entirely statistically independent from the former two factors.

Clerical Technology. The loadings on the factors in Table 7-10 seem to indicate that the items of this group, when entered into factorial analysis separate into three factors. Factor I could still be labelled as

Table 7-9a

Factor Structure of Co-Worker's Evaluative Orientation in Drilling Technology

Item	Normativeness-Integration	Competence	h^2
Competence			
Facility(-ties)		0.68951	0.55067
Cooperation		0.77605	0.75888
Disposal		0.57352	0.37431
Sanctions		0.81007	0.70795
Normativeness			
Privilege	0.67330		0.46009
Loyalty(-ties)	0.93755		0.90683
Authority	0.62372	0.42400	0.56880
Responsibility	0.95248		0.96114
Integration			
Occasions			0.13447
Symbolization		0.48153	0.23746
Receptiveness	0.41867		0.31163
Representation	0.69930		0.64025
Eigenvalue	5.57481	1.81070	
Percentage of Variance	46.5	15.1	
Cumulative Percentage	46.5	61.5	
Number of Respondents	15		

Table 7-10

Factor Structure of Co-Worker's Evaluative Orientation in Clerical Technology

Item	Competence	Integration	Normativeness	h^2
Competence				
Facility(-ties)				1.00000
Cooperation	0.53408			1.00000
Disposal	0.55239			1.00000
Sanctions	0.52241			1.00000
Normativeness				
Privilege			0.45176	1.00000
Loyalty(-ties)				1.00000
Authority			0.45671	1.00000
Responsibility			0.45487	1.00000
Integration				
Occasions		0.60313		1.00000
Symbolization		0.53807		1.00000
Receptiveness			0.40791	1.00000
Representation		0.44530		1.00000
Eigenvalue	4.95710	4.42801	0.86766	
Percentage of Variance	41.3	36.9	7.2	
Cumulative Percentage	41.3	78.2	85.4	
Number of Respondents	10			

competence, factor 2 as integration, and factor 3 as normativeness. All three factors explain 85.4 per cent of the total variance.

A closer look at the items and the factors on which they load highest, reveals that some items cluster in factors other than those theorized, and the items of facility and loyalty have no high loadings at all. Furthermore, all loadings are relatively low compared to the other groups.

The major difference, however, is found in the communalities. All of them are unity. The explanation given by Rummel (1970:318) is that under this condition each variable is completely contained in the common factor space of the other variables. Therefore, each item can be predicted or generated by the common factor. If this is the case, the items selected are a poor sample of the domain for the clerical co-worker. These findings are considered as supporting the prediction that clerical technology shows most of the degeneration of the "ideal factor structure". Placing emphasis on the interpretation of the communality as a special case, further interpretation of the factors and their items becomes unimportant.

Conclusion. As was the case with the trainees, the above results indicate that items entered into factorial analysis produce an increasingly degenerative factor structure when continuous process, craft, drilling, and clerical technologies are compared. Operators exhibit a distinct pattern, craftsmen do as well with some crossloadings, whereas drilling technology co-workers do so to a lesser extent. In fact, most of the variance among this group can be explained by two rather than three factors. Co-workers in clerical technology fit the ideal factor structure least, as the unity of communality of all items indicates. Therefore Hypothesis II (2) is supported.

THE SUPERVISOR'S EVALUATIVE ORIENTATION

Data for factor analysis are available from 61 supervisors about 101 northern trainees. The missing data pertain to trainees who had been employed in northern drilling sites for short periods of time, but had left the training program at the time of interviewing. Their respective supervisors could not be located.

Again, 12 indicators are selected, conceptually representative of the component concepts.

The Supervisor's Evaluative Orientation as a Group

The hypothesis to be tested is:

> Hypothesis I (3): Evaluative items of supervisors entered in factorial analysis will separate into three identifyable factors that can be interpreted as competence, normativeness, and integration.

Items of all supervisors combined present the factor structure and factor pattern as set out in Table 7-11, explaining 57.3 per cent of the total variance. All items load on one of the three factors above ±.4 with moderate loadings on some of the others. The items of cooperation, privilege, and loyalty(-ties) exhibit the lowest communalities, whereas 'responsibility' has the highest communality. Integration explains most of the total variance, followed by competence and normativeness.

In general, a superficial reaction to these results might bring to question why integration, rather than normativeness explains most of the variance, when one assumes that the supervisor-trainee relation

Table 7-11

Factor Structure of Supervisor's Evaluative Orientation by Integration, Competence, and Normativeness

Item [a]	Integration	Competence	Normativeness [b]	h^2
Competence				
Facility(-ties)		0.54682		0.35445
Cooperation		0.48774		0.28917
Disposal		0.62177		0.48039
Sanctions		0.61748		0.43639
Normativeness				
Privilege			0.50686	0.28100
Loyalty(-ties)			0.45008	0.26656
Authority			0.50396	0.33066
Responsibility			0.82471	0.78331
Integration				
Occasions	0.59665			0.39375
Symbolization	0.63950			0.49679
Receptiveness	0.80564			0.68543
Representation	0.55185			0.51175
Eigenvalue	4.13058	1.56920	1.17668	
Percentage of Variance	34.4	13.1	9.8	
Cumulative Percentage	34.4	47.5	57.3	
Number of Respondents	101			

---

[a] These twelve variables have been selected on the principle of one-to-one mapping from component concepts to indicators. Indicators were selected by the criterion of face-validity.

[b] All loadings of these factors are given in Table 7, Appendix B. The factor loadings for four factors are given in Table 7a, Appendix B.

focuses primarily on the institutional system within the industrial setting. The question is legitimate, but elaboration is postponed until the factor structures according to the different types of technology are discussed. At this point, a short answer has to suffice: namely, that in some types of technology contact between supervisor and trainee on the formal level is negligible on account of the co-workers' involvement in the training of trainees.

Factor 1: Integration. Factor 1 explains 34.4 per cent of the variance. It can appropriately be called integration. The questions of the first three items directed to the supervisor refer to the trainee's shyness (Occasions), friendliness (Symbolization) and consideration (Receptiveness). The item of receptiveness has the highest loading on this factor and at the same time the second highest communality, followed by the items of symbolization and occasions. The fourth question is aimed at the general evaluation of how the trainee fits into the work group (Representation). Obviously, this last indicator can elicit different responses, depending on what meaning is attached to it. The supervisor may think in terms of integration, or else in terms of competence. The item's relatively high communality in conjunction with the moderate loading on integration reflects this ambiguity. All other loadings of the remaining items are near zero on this factor.

Factor 2: Competence. Between factor 1 and factor 2 there is a big drop in eigenvalue, as well as in the variance explained (Table 7-11). The loadings on this factor are considered as moderate, with the item of cooperation being the lowest of all four. The trainee's work skill is used as an indicator for the item of sanctions. The supervisor's treatment of the trainee as compared to other workers is used as an indicator for the item of disposal. These two items load highest but exhibit moderate communality. The fourth item, facility(-ties) (the ability of the trainee to learn), has a .5 loading. In addition to those loadings some low crossloadings are apparent. Especially the items of representation and responsibility show loadings of .3 on the competence factor. All other loadings, with the exception of 'symbolization', are around .1. In summary, the competence factor is explained by items which were predicted to form that construct.

Factor 3: Normativeness. In terms of eigenvalue and variance explained, this factor shows less distinction from the competence factor than did the latter from the integration factor. With an eigenvalue of 1.18 it explains 9.8 per cent of the total variance.

The highest loading and the highest communality are found on the item of responsibility. The items of authority (how the supervisor finds the trainee to supervise) and privilege (related to the trainee's punctuality and/or absenteeism) load moderately. The lowest loading is represented by the item of loyalty(-ties).

Conclusion. Items of supervisors entered into factorial analysis cluster into three factors which can be defined as competence, normativeness, and integration. Hypothesis I (3) is therefore supported. Some low crossloadings exist, but they are considerably lower than those loadings contributing to the interpretation of the factors.

Integration emerges as the most important factor, followed at a distance by competence and normativeness. This pattern is reversed from that found when the same items (though different indicators) were used in the factorial analysis of the co-worker. It was pointed out in the previous section that many co-workers are made responsible for the supervision and training of trainees. It is hence inferred that in those instances, the supervisor places priority on the integrative factor rather than on the competence and normativeness factors.

Supervisor's Evaluative Orientation by Type of Technology

The relevant hypothesis for the supervisor's evaluative orientation towards the trainee is as follows.

> Hypothesis II (3): Evaluative items of supervisors employed in continuous process, craft, drilling, and clerical technology will fall into the conceptual pattern in decreasing order.

Continuous Process Technology. Compared to the findings for all supervisors, the items show similar loadings for this sub-group. Integration, explaining 31.9 per cent of the variance with an eigenvalue of 3.83 is followed by competence explaining 18.5 per cent of the total variance, and by normativeness in third position explaining 10.7 per cent of the total variance. The total variance explained by these three factors, then, is higher than that of all supervisors combined. In addition, the difference of variance explained between the three factors has somewhat converged (Table 7-12).

Integration, the most important factor, exhibits a clear factor structure. The additional items do not contribute to that factor and load around point zero or point one. Within this factor, receptiveness is most correlated, and occasions least.

The second important factor, competence, has an additional low loading on the representation item. This points to the fact that

Table 7-12

Factor Structure of Supervisor's Evaluative Orientation in Continuous Process Technology

Item	Integration	Competence	Normativeness	h^2
Competence				
Facility(-ties)		0.64095		0.49635
Cooperation		0.47757		0.24515
Disposal		0.70815		0.62596
Sanctions		0.56706	0.41970	0.54074
Normativeness				
Privilege			0.47530	0.25668
Loyalty(-ties)			0.58880	0.45208
Authority				0.17811
Responsibility			0.82398	0.70177
Integration				
Occasions	0.54982			0.34980
Symbolization	0.77499			0.66645
Receptiveness	0.83633			0.69993
Representation	0.71782	0.49319		0.75909
Eigenvalue	3.82587	2.21872	1.28427	
Percentage of Variance	31.9	18.5	10.7	
Cumulative Percentage	31.9	50.4	61.4	
Number of Respondents	42			

integration and competence are not entirely statistically independent. It confirms the interpretation hinted at previously, that the question of how the trainee fits into the work group has left room for two different meanings elicited with the response: a) how well is the trainee accepted in the work group, or b) how well does he perform his tasks as part of the work group. All other items not contributing to this factor have either insignificant loadings or load point one.

The normativeness factor shows the least clearly defined structure of the three. Considering the rule of defining factors by loadings above or below .4, the factor consists of three items that were hypothesized as contributing to this factor. However, the item of sanctions has a low loading on this factor. Also, two other items, authority and disposal, load around .35. The interpretation of this factor in terms of its placement and the items that comprise it, must focus on the issue that in the continuous process technology the supervisor is of secondary importance in training and supervision of the trainee. This interpretation would concur with that of the co-workers, where normativeness explained most of the total variance. If these circumstances exist, the ethical system is less important, especially the authority relation between supervisor and trainee. In addition, the separation of the three factors is less distinct as was found to be among trainees and co-workers in the same type of technology.

Craft Technology. Table 7-13 presents the factor structure for supervisors in craft technology. All but one item load on the first

Table 7-13

Factor Structure of Supervisor's Evaluative Orientation in Craft Technology

Item	Normativeness	Competence	Symbolization	h^2
Competence				
Facility(-ties)		0.57431		0.38720
Cooperation		0.49926		0.30669
Disposal	0.51641	0.62204		0.69098
Sanctions		0.66326		0.44342
Normativeness				
Privilege	0.80393			0.69668
Loyalty(-ties)	0.90205			0.84706
Authority	0.64738			0.49870
Responsibility	0.65402			0.64322
Integration				
Occasions		0.94363		0.90721
Symbolization			0.79805	0.64596
Receptiveness	0.44825	0.73316		0.76420
Representation	0.74272			0.69518
Eigenvalue	5.40849	1.91484	1.20251	
Percentage of Variance	45.1	16.1	10.0	
Cumulative Percentage	45.1	61.0	71.0	
Number of Respondents	23			

and/or second factor. For this reason, factor 1 explains 45.1 per cent and factor 2, 16.1 per cent of the total variance. But the items with high or acceptable loadings do not conceptually fall into the normativeness-competence dimension as predicted. Since items of normativeness load high on the first factor, the factor may still be defined as normativeness. The item of loyalty(-ties) explains .82 of that factor. In addition, however, the items of disposal and receptiveness load moderately, and 'representation' loads fairly high. Only two other items load around point zero. The supervisor's treatment of the trainee (Disposal) and the trainee's consideration (Receptiveness) are both ethical as well as pragmatic issues. Furthermore, the question of whether or not the trainee fits into the work group (Representation) seems to be of normative, rather than integrative concern.

The second factor explains 16.1 per cent of the variance and can be called competence. In addition to the expected items, 'receptiveness' has a crossloading, and 'occasions' loads high on this factor only. Shyness, then, is correlated with ability to learn and can be interpreted as an indicator of 'facility' rather than of 'occasions'.

Factor 3 is a single-item factor. It is named according to this item: symbolization. The high loadings of all items on the first two factors with the exception of the item of symbolization indicate that the supervisor's evaluation in craft technology is primarily two-dimensional. Table 7-13a presents the finding supporting this expectation, that two factors are sufficient to adequately explain all but the symbolization item.

In summary, the interpretation given to the factor structure of the craft supervisor cannot be entirely finalized. The data do, however,

Table 7-13a

Factor Structure of Supervisor's Evaluative Orientation in Craft Technology

Item	Normativeness-Integration	Competence	h^2
Competence			
Facility(-ties)		0.57544	0.38837
Cooperation		0.50097	0.30883
Disposal	0.52373	0.64066	0.68474
Sanctions		0.66305	0.44242
Normativeness			
Privilege	0.81694		0.71140
Loyalty(-ties)	0.88997		0.79617
Authority	0.64937		0.47818
Responsibility	0.63769		0.51355
Integration			
Occasions		0.91340	0.85540
Symbolization			0.03270
Receptiveness	0.45743	0.74811	0.76892
Representation	0.73481		0.62260
Eigenvalue	5.40849	1.91484	
Percentage of Variance	45.1	16.0	
Cumulative Percentage	45.1	61.0	
Number of Respondents	23		

support the notion that supervisor's evaluative orientation in craft technology shows a degenerative factor structure when compared to the total group of supervisors, as separate items entered into factorial analysis can be adequately explained by two factors.

Drilling Technology. Factor 1 in Table 7-14 shows loadings on several items of all three constructs, with a predominance of items conceptualized as normativeness.

Factor 2 can be called integration, although the item of representation loads below the minimum level of acceptance (.394). The items of disposal and authority show loadings of above .3 also.

To the third factor, no construct name has been assigned because the different loadings are not conceptually dependent. At best it is a weak competence factor, considering that two expected items load moderately on this factor. The item of loyalty(-ties) is correlated with some items of competence, and the item of representation appears to serve as an overall measure as it loads low on all three factors.

The difficulty in interpreting factors 1 and 2 within the evaluative theory of orientation can be resolved by factor analysing for two factors only, as presented in Table 7-14a. Judging from items that load in factor 1, this factor can be defined as competence-normativeness. The second cluster is primarily on the integration dimension, with the item of loyalty(-ties) showing a low loading. These two factors, however, are not entirely statistically independent, as the item of representation shows crossloading. With the reduction to two factors, the loadings of facility and disposal are reduced below the acceptable level. Thus, the factor structure of three factors is more adequate in terms

Table 7-14

Factor Structure of Supervisor's Evaluative Orientation in Drilling Technology

Item	Factor 1	Integration	Factor 3	h^2
Competence				
Facility(-ties)			0.51496	0.29364
Cooperation	0.55148		0.44086	0.50243
Disposal				0.20736
Sanctions	0.67851			0.53124
Normativeness				
Privilege	0.54578			0.33524
Loyalty(-ties)			0.57824	0.35882
Authority	0.65758			0.54691
Responsibility	0.83064			0.78529
Integration				
Occasions		0.59221		0.47144
Symbolization	0.40038	0.83463		0.93731
Receptiveness		0.80180		0.71725
Representation	0.42387		0.47752	0.56353
Eigenvalue	3.87457	2.08922	1.56881	
Percentage of Variance	32.3	17.4	13.1	
Cumulative Percentage	32.3	49.7	62.8	
Number of Respondents	26			

Table 7-14a

Factor Structure of Supervisor's Evaluative Orientation in Drilling Technology

Item	Competence-Normativeness	Integration	h^2
Competence			
Facility(-ties)			0.09783
Cooperation	0.61991		0.39043
Disposal			0.19299
Sanctions	0.72034		0.56980
Normativeness			
Privilege	0.56474		0.32481
Loyalty(-ties)		0.49055	0.26879
Authority	0.66151		0.51070
Responsibility	0.86642		0.80562
Integration			
Occasions		0.69290	0.48797
Symbolization		0.71824	0.65292
Receptiveness		0.82875	0.68694
Representation	0.51465	0.48464	0.49974
Eigenvalue	4.21896	2.19095	
Percentage of Variance	35.2	18.3	
Cumulative Percentage	35.2	53.4	
Number of Respondents	26		

of loadings on all items, but not in terms of our theoretical conceptualization. This degeneration of the ideal factor structure as compared to craft technology is supportive evidence for the hypothesis.

Clerical Technology. Contrary to expectations, the items for clerical supervisors exhibit at least as adequate a factor structure as do those for supervisors in the craft and drilling technologies (Table 7-15). The three factors combined explain 73.0 per cent of the total variance. All three factors are statistically dependent and can be interpreted according to the three constructs.

Factor 1 is called competence. All items of competence load relatively high, but the items of responsibility and representation load moderately. 'Responsibility' is crossloading, whereas the indicator for representation seems to carry the meaning of the trainee's "fit" into the work group on the pragmatic, rather than the integrative level.

The loadings on factor 2 cluster on the integration dimension, although the item of representation shows a below -.4 negative loading; but 'facility' also shows a moderate loading.

Factor 3 meets the interpretation of normativeness only on three items. The item of loyalty(-ties), conceptually part of this construct, loads moderately negative.

In summary, the three factors can generally be interpreted as competence, integration, and normativeness. But some crossloadings do exist and some of the indicators do not measure the conceptual items as expected.

Conclusion. The presentation of the above findings do follow the generally expected pattern in the sense that, as factor structures

Table 7-15

Factor Structure of Supervisor's Evaluative Orientation in Clerical Technology

Item	Competence	Integration	Normativeness	h^2
Competence				
Facility(-ties)	0.79002	0.54570		0.94588
Cooperation	0.75180			0.71551
Disposal	0.80988			0.76910
Sanctions	0.89115			0.82590
Normativeness				
Privilege			0.58170	0.38852
Loyalty(-ties)			(-0.52413)	0.32562
Authority			0.80361	0.72097
Responsibility	0.60377		0.78562	0.98766
Integration				
Occasions		0.77324		0.66387
Symbolization		0.84451		0.83350
Receptiveness		0.53730		0.34411
Representation	0.53443			0.34514
Eigenvalue	3.62627	3.02045	2.11199	
Percentage of Variance	30.2	25.2	17.6	
Cumulative Percentage	30.2	55.4	73.0	
Number of Respondents	10			

of continuous process, craft, and drilling technologies are compared, degeneration occurs successively. There are, however, several criteria that have not been met to give full support to the hypothesis.

Firstly, supervisor items in continuous process technology show some crossloadings which were not anticipated, as these were expected to differentiate best; at least as well as for supervisors as a group.

Secondly, items of craft supervisors do cluster into two factors, though not according to competence and normativeness, but rather according to normativeness and integration. A more serious shortcoming, however, is that they present a less distinct factor structure than do the supervisors in the drilling technology.

Thirdly, items of clerical supervisors cluster into three identifyable factors, whereas they do not so for items of supervisors in craft and drilling technologies.

Lastly, some of the items show an unanticipated shift in their acceptable loadings when different technologies are compared, rather than the anticipated crossloadings.

For the reasons cited above, Hypothesis II ~~(3)~~ is not supported by the data by an acceptable level.

SUMMARY AND DISCUSSION

Factor analysis has been employed as a method for the formulation of theoretical constructs and as a method of establishing empirical relations between indices of evaluative orientation. Twelve questions of evaluative content that serve for each component concept were selected from the data, and the responses thereto factor analysed. The resulting factors were interpreted as constructs, categorizing the conceptual characteristics of the factor results. Factor analysis provided the structure and patterns of intercorrelations among these 12 items, as well as their absolute magnitudes.

Factor analysis of the items for the trainee, the co-worker, and the supervisor (referred to as sub-groups) has supported the hypothesized statement that the actor's evaluative orientation is multi-dimensional. Although the relationships between item sets (i.e. factors) did not approximate zero, the interrelationships among items within one factor were strong or moderate. The three resulting factors are moderately interrelated (though this interrelation differs among sub-units), but the correlations within the three factors are stronger than between the factors. It was referred to as 'ideal factor structure'.

Once the ideal factor structure for the trainee, the co-worker, and the supervisor had been established, the same data were separately factor analysed according to types of technology for the above groups. The results supported the hypotheses for the trainees and the co-workers; namely that successive degeneration of the factor structure occurs when continuous process, craft, drilling, and clerical technologies are separately factor analysed. The data of the supervisors were not found supportive of the hypothesis.

The acceptance or rejection of a hypothesis was based on the following technical criteria. (1) Some items tapped more than one factor. The underlying questions of these items were considered to be double-barreled for that particular sub-group. Sanctions and symbolization of the clerical trainees are examples. So is the item of of cooperation among craft co-workers, and authority, receptiveness and representation among co-workers in the drilling technology. The increase in crossloadings among one or several items has been interpreted as loss of statistical independence among these respective factors. (2) Some items clustered with a conceptually different group of items representing a construct alien to that particular item, but with near zero point loadings on the other two factors. It was concluded in those instances that the particular question underlying the item had elicited a different response among the specific sub-group. The items of facility(-ties) and authority among trainees in drilling technology are an example. (3) Some factors consists of one item. The factor was renamed according to that item: cooperation instead of competence among trainees in drilling technology is indicative of this occurrence. In these instances most of the variance could be explained by two factors. (4) In some sub-groups the entered items were better expressed in two, rather than three factors. It was concluded in such instances that the same indicators yielding three factors in other types of technology are sufficiently well explained by two dimensions.

Subsequently, the decision of acceptance or rejection was not provided by a mathematical formula, but rather by means of visual matching and assessment.

Additional interpretations of the different factor structures among sub-groups have been made, but the reader should be made aware that these are tentative. The importance of the order of construct factors, according to the percentage of variance explained, and the differences among similar loadings, have relevance only for the particular population, as the total number of cases is relatively small.

Selecting indicators which provide an ideal factor structure for an entire sub-unit is, of course, influenced by the particular type of technology that contains most of the cases. (It is assumed that type of technology _is_ the important criterion of differentiation, otherwise the factor structure should remain the same for all types of technologies.)

To conclude, items entered into factorial analysis have clustered around three factors labelled competence, normativeness, and integration. However, when factor analysed according to type of technology, these items established different factor priorities and/or formed different constructs. In some instances, two factors were sufficient to explain most of the variance.

Blalock emphasizes that all measurement is to some degree indirect, involving states of observers combined with element concepts that produce hypothetical statements (Blalock, 1970:89-92). Inference from observer states and element concepts to constructs has been based on the theory of evaluative orientation, and factor analysis provided the formal (mathematical) relations for these constructs. The fact that the factor structures for the trainee, the co-worker, and the supervisor yield similar results, despite the use of different indicators is felt to be a significant contribution in sociology.

Chapter 8

THE SOCIO-TECHNICAL SYSTEM AND THE ACTOR'S EVALUATION

This chapter examines the factual content of the actor's evaluative orientation, employing the constructs formally developed in the previous chapter.

Factor analysis is used as a method of reducing the complexity of the data, by grouping all entered variables into scales (according to factors) by transforming subject responses into factor scores. In calculating factor scores, the complete estimation method is employed, whereby some variables are simply used as suppression variables to give the best estimate of the given factor (SPSS, 1975:488-489). Only cases with no missing data are retained in the analysis. The factor scores for the trainee, the co-worker, and the supervisor of the items entered in factorial analysis form the sets of dependent variables. The socio-technical system of the petroleum industry is regarded as the independent variable, and ethnicity and size of work group are considered as control variables.

Analysis of variance and covariance are used to test Hypotheses III dealing with the relation between the type of technology and the group mean evaluation scores. As the sample of this study is small, significance testing is of little value. Multiple classification analysis scores are examined and the pattern of changes in the group means of the dependent variable, as more control variables are introduced, are interpreted. A difference of ±0.10 deviation of one or more group means from the grand mean is considered as meaningful; if deviation of that magnitude in the predicted direction occurs, the hypothesis will be seen as substantiated.

The Trainee's Evaluation of the Work Situation

The trainee's evaluation is directed towards the company's competence, towards the supervisor's normativeness, and towards the co-worker's integration. The evaluation of the trainee on these three constructs will be examined.

Competence. The company is considered by the trainee as a producer. It provides the trainee with the facilities, the cooperation in the training effort, and sanctions in the form of wages and fringe benefits in return for his labour.

Hypothesis III (1a): Trainees employed in craft, continuous process and drilling technology will successively have a lower group mean of competence in evaluating their relation with the company when ethnicity of the trainee and size of work group are controlled for.

Table 8-1 presents the unadjusted and adjusted group means of the trainee's evaluation of the company by type of technology, indicating meaningful differences in competence. Considering first the unadjusted group means of the different types of technology, trainees in the craft technology evaluate the company highest, followed by trainees in the continuous process technology. Both groups are above the grand mean, whereas trainees in the drilling technology are below. The latter group is considered to be the most dissatisfied one.

Table 8-1

Trainee's Competence Evaluation Group Means
by Type of Technology, Controlling for
Ethnicity and Size of Work Group

Technology	No.	Unadjusted	Adjusted for Ethnicity	Adjusted for Independent and Covariate
Craft	21	0.23	0.20	0.18
Continuous	27	-0.02	0.15	0.13
Drilling	14	-0.30	-0.59	-0.53
Grand Mean -0.03				

As it was assumed that differences among ethnic groups exist at least in some dimensions of evaluative orientation, ethnicity is introduced as a control variable. Column 3 in Table 8-1 presents the group means for the type of technology when adjusted for ethnicity. The changes in the continuous process and drilling technology are meaningful, whereas craft technology remains relatively constant. The introduction of size of work group as covariate has no meaningful effect on these group means.

The group means in column 4 for the various types of technology support the hypothesis that trainees in the craft technology evaluate the company's competence highest, followed by a margin by trainees of the continuous process technology. The margin between the two technologies is not large, as the trainees have similar advantages in both technologies. Craft trainees, however, seem to have an edge over operator trainees which is seen as the advantage of learning a trade within the most favourable industry. Drilling crews, by contrast, are obliged to operate under extreme weather conditions and away from home without great benefits. Their dissatisfaction is expressed by their low evaluation of the company's competence. Since many Inuit are employed in the drilling technology, they actually make conditions they work under look more acceptable than they would appear if more trainees from other ethnic groups were thus employed.

Normativeness. On-the-job training requires access to the supervisor within the training context. It requires the supervisor's interest in the trainee, his availability and his responsibility, and the authority he entrusts in the trainee. The hypothesis dealing with the trainee's normative evaluation directed towards the supervisor is as follows:

> Hypothesis III (1b): Trainees employed in craft, continuous process, and drilling technology will successively have a lower group mean of normativeness in evaluating their relation with the supervisor when ethnicity of the trainee and size of work group are controlled for.

In Table 8-2 the unadjusted group means of normative evaluation for ethnicity and types of technology are presented, indicating meaningful differences but not in the predicted direction. Considering the unadjusted group means by type of technology first, the drilling technology scores highest, followed by the craft technology and last by the continuous process technology. Adjusting for ethnicity, the group means in column 3 show no meaningful change. Introducing the covariate still does not give meaningful changes in the predicted direction. Therefore the above data do not support the hypothesis.

A tentative explanation of the meaningful difference between craft and continuous process technology on the one hand the drilling

Table 8-2

Trainee's Normativeness Evaluation Group Means
by Type of Technology, Controlling for
Ethnicity and Size of Work Group

Technology	No.	Unadjusted	Adjusted for Ethnicity	Adjusted for Independent and Covariate
Craft	21	-0.04	-0.05	-0.04
Continuous	27	-0.10	-0.08	-0.06
Drilling	14	0.24	0.24	0.16
Grand Mean 0.04				

technology on the other may be given, namely that in the drilling technology the supervisor is part of the drilling crew; the successful operation depends on his participation in the team effort. Under these conditions, the trainee will evaluate the supervisor more positively, as his orders, explanations and involvement in the tasks are considered essential and not arbitrary. In addition, the supervisor has continuous contact with the trainee on the drilling floor, permitting more contact than in the other technologies. Therefore, when ethnicity and size of work group are controlled for, the craft and continuous process technologies are similar, but less positive in terms of the trainees' evaluation of their supervisors. These trainees are frequently under the informal supervision of their co-workers, with the supervisor being considered more as an authority figure who assigns tasks, gives orders and is generally less available. If this interpretation is correct, trainees in the craft and continuous process technologies would evaluate their relation with the supervisor less favourably.

Integration. The trainee evaluates his relation with co-workers in terms of their acceptance of him as part of the informal structure of the work group. The following hypothesis will test the trainees' integrative evaluation.

> Hypothesis III (1c): Trainees employed in craft, continuous process, and drilling technology will successively have a lower group mean of integration in evaluating their relation with co-workers when ethnicity of the trainee and size of work group are controlled for.

The unadjusted group means, indicating meaningful differences in integration, show trainees in the continuous process technology as being the most integrated, trainees in the craft technology as close to the grand mean, and trainees in the drilling technology as far below the grand mean (Table 8-3).

When adjusted for ethnicity, meaningful changes in the patterns of group means according to type of technology take place. The data show that craft technology within the petroleum industry is the most conducive technology for integration. Next is continuous process technology. The drilling technology does not lend itself for integration as well as the former two. In fact, without adjusting for ethnicity, the group mean in drilling technology appears to be more favourable for integration. The reverse holds true for craft technology. Until adjustment for ethnicity is made, craft technology appears to be characterized by lower integration.

The introduction of the covariate meaningfully changes the actual group means within the types of technology, but the pattern remains the same. Column 4 in Table 8-3 gives the group means for

Table 8-3

Trainee's Integration Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group

Technology	No.	Unadjusted	Adjusted for Ethnicity	Adjusted for Independent and Covariate
Craft	21	0.01	0.31	0.34
Continuous	27	0.15	0.11	0.15
Drilling	14	-0.30	-0.67	-0.79
Grand Mean 0.02				

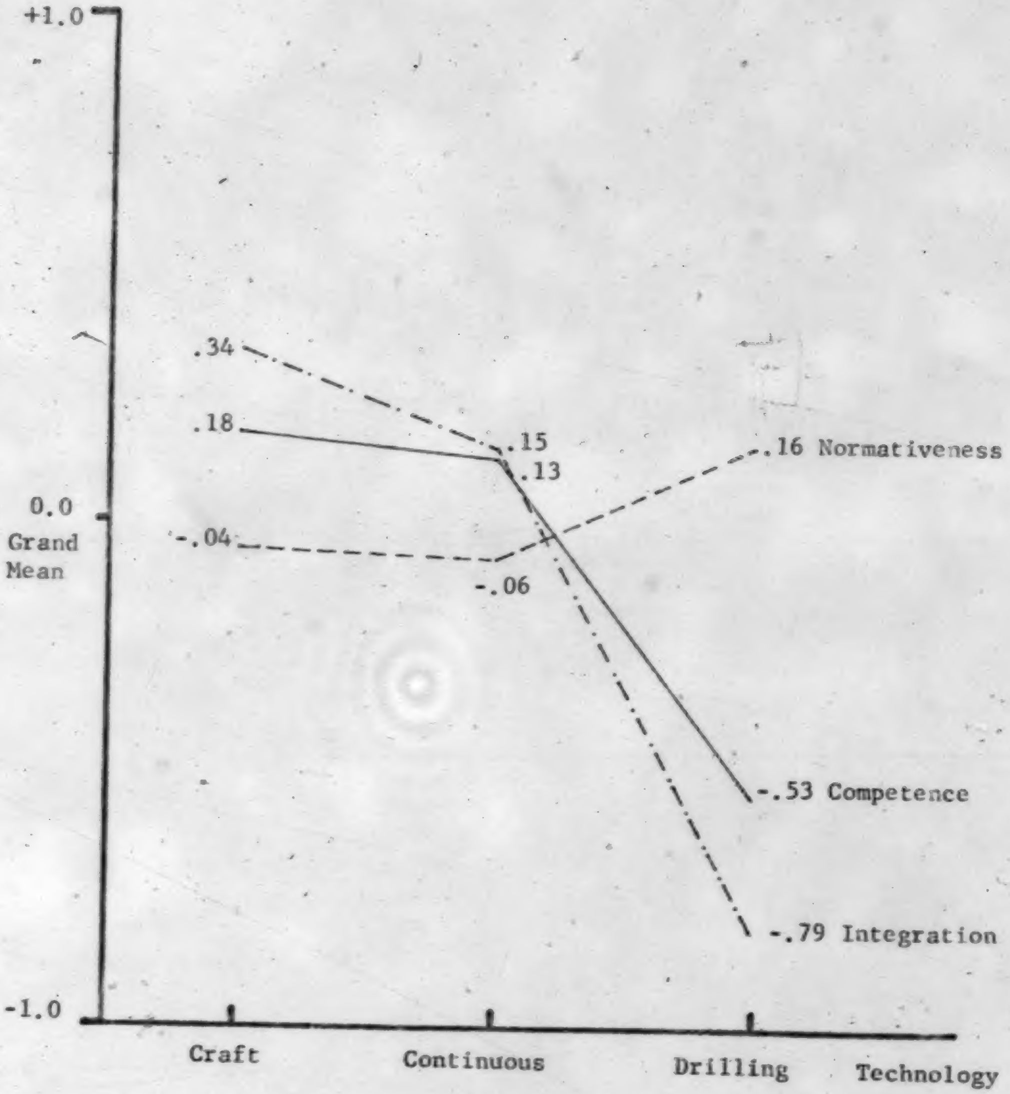
types of technology, when ethnicity and size of work group are introduced. The differences between the group means of the different types of technology are meaningful and lean in the predicted direction. Therefore Hypothesis III (1c) is substantiated.

Summary. The above discussion has centered around the three industrial types of technology, introducing ethnicity as an independent and size of work group as a covariate in the analysis of variance. The hypotheses concerning the trainee's competence and integration evaluation have been substantiated, whereas the hypothesis concerning the trainee's normativeness evaluation was not supported by the data. Figure 8-1 gives a visual presentation of Mean Evaluation Scores showing the effects the type of technology has on competence, normativeness, and integration evaluation when ethnicity and size of work group are controlled for.

The meaningful differences in group means of the trainees' evaluation have been attributed to the variation of the socio-technical

Figure 8-1

Mean Evaluation Scores of Trainees by Type of Technology



pattern. Ethnicity, representing a set of known and unknown attributes of the trainee, has acted as a suppressor on the evaluative group means of the trainees.

The small variation in the size of the work groups among types of technology is accounted for by the insignificant changes that occur in group means when size of work group is introduced as a covariate.

The Co-Worker's Evaluation of the Trainee

The co-worker's evaluation is directed towards his relation with the trainee.

Competence. As the co-worker works beside the trainee, he will evaluate him in terms of what he provides for the performance of tasks. He defines him as a producer, assessing his facility(-ties), his cooperation and the skills he acquires during on-the-job training. In some types of technology, though not in others, the co-worker in turn will have to compensate for the trainee's competence - or lack of it - with his own. This difference is expected to influence his evaluation of the trainee. The following hypothesis will be tested.

> Hypothesis III (2a): Co-workers employed in craft, continuous process, and drilling technology will successively have a higher group mean of competence in evaluating their relation with the trainee when ethnicity of the trainee and size of work group are controlled for.

Table 8-4 shows the unadjusted and adjusted group means of the co-worker's competence evaluation indicating meaningful differences as predicted. According to type of technology, the unadjusted group mean in craft technology is, as expected, below the grand mean, that of continuous process technology near the grand mean, with the drilling

Table 8-4

Co-Worker's Competence Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group

Technology	No.	Unadjusted	Adjusted for Ethnicity	Adjusted for Independent and Covariate
Craft	19	-0.22	-0.30	-0.27
Continuous	39	0.01	0.00	0.01
Drilling	13	0.30	0.43	0.37
Grand Mean 0.05				

technology quite distinctly above the grand mean.

The effect ethnicity has on the type of technology is shown when columns 2 and 3 in Table 8-4 are compared. When adjusting for ethnicity as an independent, trainees in the craft technology are evaluated as still less competent than when ethnicity is not controlled for. In the drilling technology, the reverse holds true. Introducing the covariate in addition to the independent, does not meaningfully affect the group mean. The figures in column 4 of Table 8-4 substantiate the hypothesis.

Normativeness. In the ethical system, the co-worker evaluates the trainee in terms of whether or not he considers working with him as a privilege, of whether or not the trainee shows interest in the operation and follows company regulations, and of the trainee's sense of responsibility.

> Hypothesis III (2b): Co-workers employed in craft, continuous process, and drilling technology will successively have a higher group mean of normativeness in evaluating their relation with the trainee when ethnicity of the trainee and size of work group are controlled for.

The unadjusted group means for types of technology in Table 8-5 show no meaningful differences. When ethnicity is introduced as a control variable meaningful differences in group means by type of technology exist (column 3 in Table 8-5). Co-workers in the craft technology evaluate the trainees least favourably, the group mean of co-workers in the continuous process technology is close to the grand mean, and the co-workers in the drilling technology evaluate the trainees comparatively positively.

The additional introduction of the covariate does not meaningfully alter these results. Therefore, the above hypothesis is seen as substantiated.

Integration. Integration is the formalization of questions referring to the trainee's shyness, his friendliness, the consideration he shows towards his co-workers, and his acceptance by the work group. The following hypothesis will be tested.

> Hypothesis III (2c): Co-workers employed in craft, continuous process, and drilling technology will successively have a lower group mean of integration in evaluating their relation with the trainee when ethnicity of the trainee and size of work group are controlled for.

The unadjusted group means for the types of technology indicate meaningful differences in integration (Table 8-6). Craftsmen trainees are considered to be by far the most integrated trainees, and the trainees in the continuous process technology the least integrated.

Table 8-5

Co-Worker's Normativeness Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group

Technology	No.	Unadjusted	Adjusted for Ethnicity	Adjusted for Independent and Covariate
Craft	19	-0.03	-0.13	-0.10
Continuous	39	-0.01	-0.01	0.01
Drilling	13	0.02	0.18	0.11

Grand Mean 0.02

Table 8-6

Co-Worker's Integration Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group

Technology	No.	Unadjusted	Adjusted for Ethnicity	Adjusted for Independent and Covariate
Craft	19	0.46	0.52	0.53
Continuous	39	-0.23	-0.23	-0.23
Drilling	13	0.00	-0.05	-0.08

Grand Mean 0.05

The adjusted group means for types of technology in Table 8-6 show changes in craft and drilling technologies that are not interpreted as meaningful. Nor is the additional introduction of the covariate thus considered. Although co-worker within the craft technology evaluate the trainees as most integrated, the other two types of technology do not follow the predicted pattern. Therefore, the available data do not support the hypothesis on integration.

Summary. The above findings establish a pattern that substantiates the hypotheses on competence and normativeness, but only partly the integration hypothesis. Figure 8-2 presents visually the Mean Evaluation Scores of Co-Workers according to types of technology when ethnicity and size of work group are controlled for.

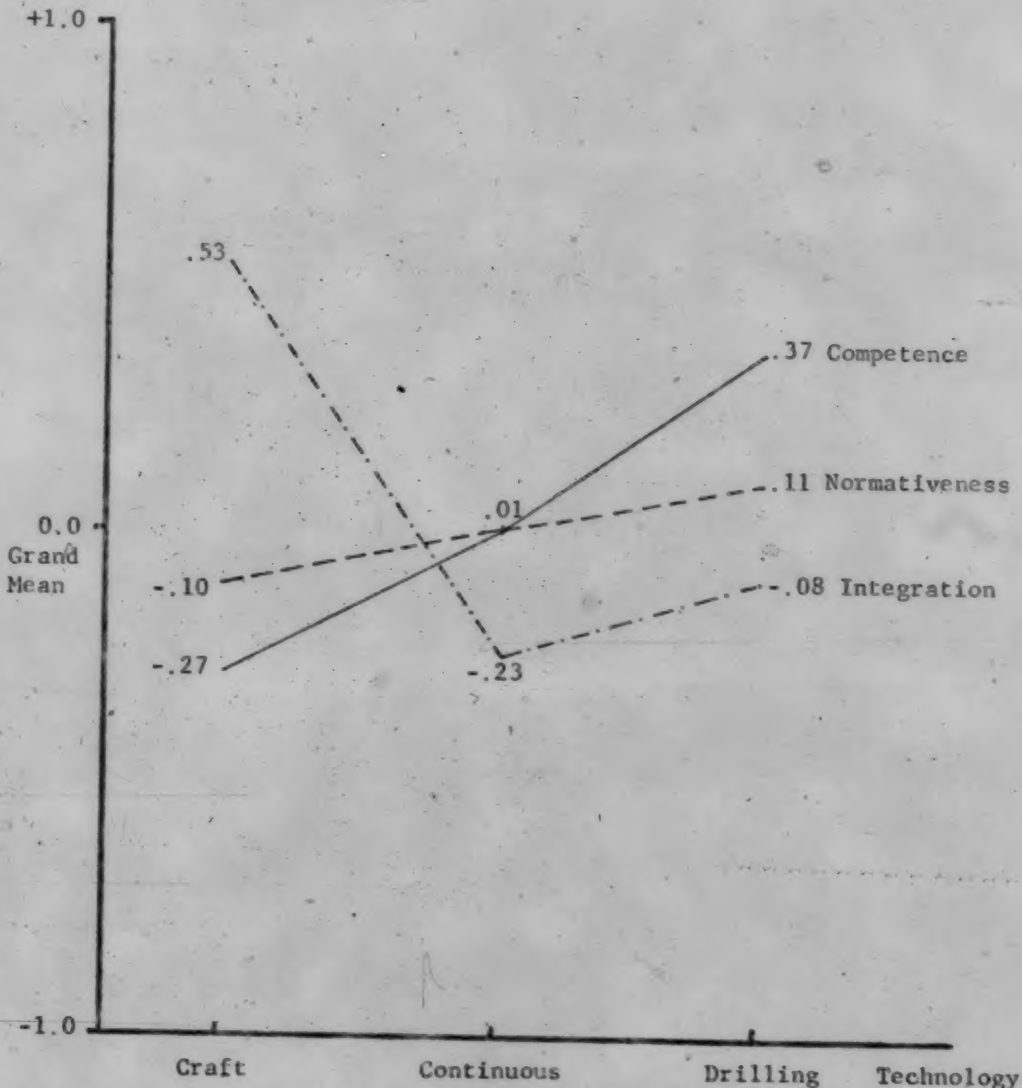
The type of technology places constraints on the co-worker which affect his evaluation of the trainee, as different technologies demand different levels of involvement for both parties. In the craft technology, the trainee's integration is evaluated as highly positive, compared to the other types of technology, but both competence and normativeness are evaluated below the grand mean. In continuous process, trainees receive the most negative evaluation on the dimension of integration, but are close to the grand mean on competence and normativeness. In the drilling technology, trainees are evaluated as most competent and normative, but are not considered as being well integrated.

Ethnicity of the trainee has been found to have a meaningful effect on the co-worker's evaluation in some types of technology but not in others.

The introduction of size of work group as a covariate has not established meaningful differences; undoubtedly as a result of the small variation among different types of technology on this dimension within the petroleum industry.

Figure 8-2

Mean Evaluation Scores of Co-workers
by Type of Technology



The Supervisor's Evaluation of the Trainee

Different types of technology place different constraints on both the supervisor and the trainee. They are considered to affect the supervisor's evaluation of the trainee. Deviations from the grand mean according to types of technology are therefore expected to be primarily a result of the technical structure.

Competence. The supervisor evaluates the trainee's competence in terms of his ability to learn, his working skill, his cooperation, and whether or not he must treat him differently from other workers. The relevant hypothesis is presented below.

> Hypothesis III (3a): Supervisors employed in craft, continuous process, and drilling technology will successively have a lower group mean of competence in evaluating their relation with the trainee when ethnicity of the trainee and size of work group are controlled for.

Table 8-7 presents the unadjusted and adjusted group means deviations from the grand mean according to type of technology. Considering unadjusted group means for the various types of technology, meaningful differences exist between the continuous process and drilling technologies; the former showing a negative and the latter a positive deviation from the grand mean.

When adjusted group means for different types of technology are considered, there is no indication of meaningful changes. The additional introduction of the covariate has no significant effect either. Since trainees in the drilling technology are evaluated as more competent than trainees in the craft and continuous process technologies, the data do not support the hypothesis.

Table 8-7

Supervisor's Competence Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group

Technology	No.	Unadjusted	Adjusted for Ethnicity	Adjusted for Independent and Covariate
Craft	23	0.00	-0.06	-0.03
Continuous	42	-0.06	-0.07	-0.06
Drilling	27	0.09	0.16	0.12

Grand Mean 0.04

Normativeness. The evaluation by the supervisor of the trainee on normativeness refers to the supervisor's relation with the trainee, each defining the other as occupying an office. The relevant hypothesis is as follows:

> Hypothesis III (3b): Supervisors employed in craft, continuous process, and drilling technology will successively have a lower group mean of normativeness in evaluating their relation with the trainee when ethnicity of the trainee and size of work group are controlled for.

In Table 8-8, the unadjusted group means according to types of technology of the supervisor's normative evaluation of the trainee differ meaningfully. As predicted, in craft technology, supervisors evaluate trainees above the grand mean, in continuous process technology the group mean is close to the grand mean, and in drilling technology trainees are evaluated as below the grand mean.

When the group means of the different types of technology in

Table 8-8

Supervisor's Normativeness Evaluation Group Means by Type of Technology, Controlling for Ethnicity and Size of Work Group

Technology	No.	Unadjusted	Adjusted for Ethnicity	Adjusted for Independent and Covariate
Craft	23	0.16	0.21	0.22
Continuous	42	0.00	-0.01	-0.00
Drilling	27	-0.14	-0.17	-0.18

Grand Mean 0.03

columns 2 and 3 are compared, these do not change meaningfully, though the deviation from the grand mean increases in the craft and drilling technologies. Again, the additional introduction of the covariate does not introduce any significant changes.

In summary, then, it can be maintained that supervisors' evaluation on normativeness is highest for trainees in the craft technology, followed by continuous process, with the lowest scores given to trainees in the drilling technology. These findings substantiate the hypothesis.

Integration. The supervisor's evaluation of the trainee's integration is primarily directed towards the informal work group. The general pattern of deviation of group means of this construct should therefore follow the patterns established in the cases of trainees and co-workers. The relevant hypothesis is reiterated below.

Hypothesis III (3c): Supervisors employed in craft, continuous process, and drilling technology will successively have a lower group mean of integration in evaluating their relation with the trainee when ethnicity of the trainee and size of work group are controlled for.

The unadjusted group means by types of technology as shown in Table 8-9 clearly separate the craft technology from the other two technologies by showing meaningful differences. Trainees in craft technology are considered as most integrated, whereas those in continuous process technology are evaluated as least integrated.

The effect ethnicity has on the group means of the various types of technology is seen in the change of the deviation from the grand mean when ethnicity is adjusted for (see column 3 in Table 8-9). Supervisors accord the craftsman trainee a significantly higher evaluation than they give the operator trainee. In the drilling technology, the group mean deviates negatively from the grand mean. When size of work group as covariate is additionally introduced, it does not meaningfully change the existing group means. As the deviations of group means are considered to be meaningful and in the predicted direction, the integration hypothesis is seen as substantiated.

Summary. The above findings indicate that in their evaluation of the trainee, supervisors do differentiate by type of technology on the three constructs. The hypotheses dealing with the supervisor's evaluation of the trainee's normativeness and integration have been substantiated, whereas the hypothesis on the evaluation of competence was not supported by the data. Figure 8-3 gives a visual presentation of Mean Evaluation Scores of competence, normativeness, and integration of supervisors by type of technology when ethnicity of the trainee and

Table 8-9

Supervisor's Integration Evaluation Group Means
by Type of Technology, Controlling for
Ethnicity and Size of Work Group

Technology	No.	Unadjusted	Adjusted for Ethnicity	Adjusted for Independent and Covariate
Craft	23	0.13	0.21	0.22
Continuous	42	-0.08	0.00	0.01
Drilling	27	0.00	-0.19	-0.20
Grand Mean 0.01				

size of work group are controlled for.

In craft technology, supervisors evaluate trainees more positively than the continuous process trainees. The trainees in the drilling technology are evaluated as the most competent group, but they receive the most negative evaluation on normativeness and integration.

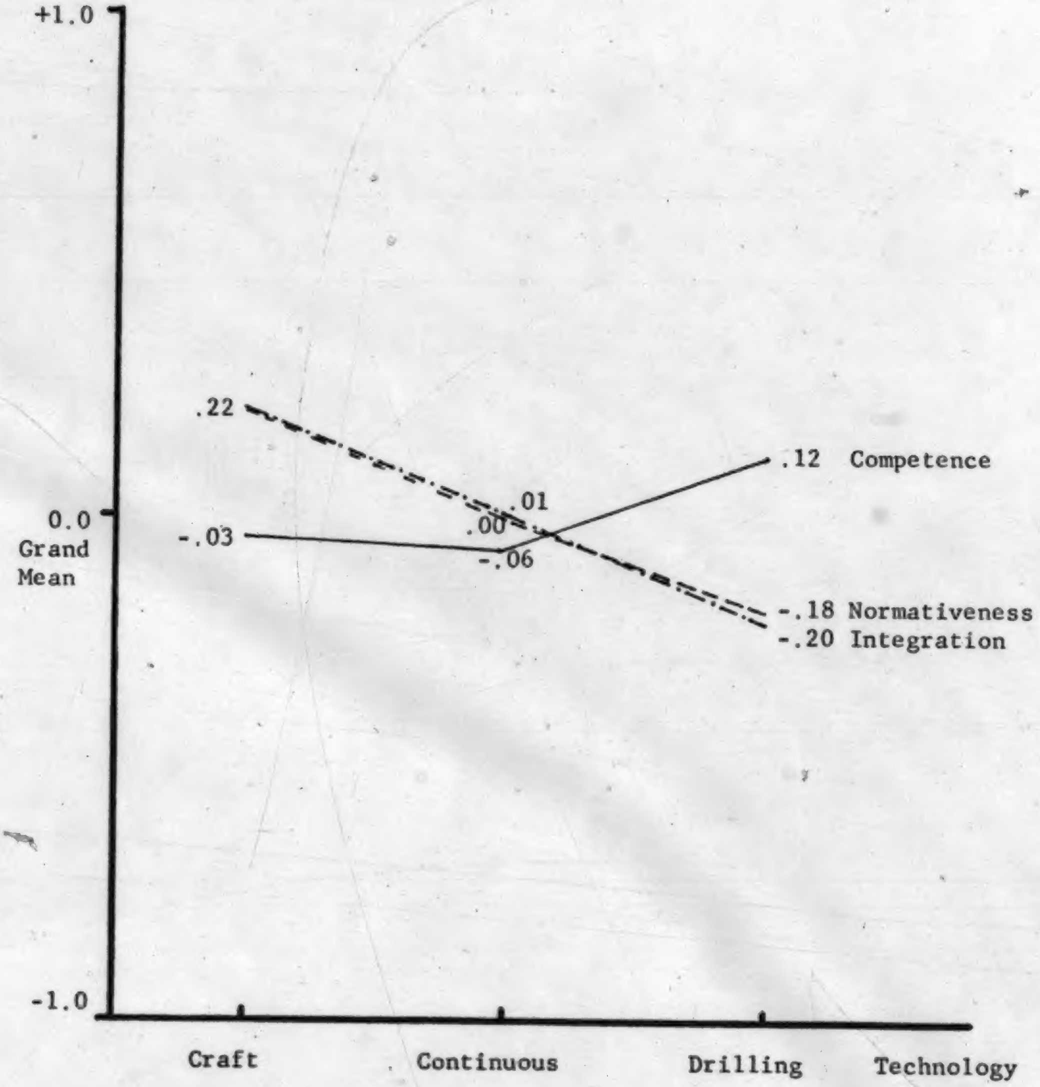
Ethnicity of the trainee has been found to have a meaningful effect on competence and integration, but not on normativeness when introduced as a control variable. The introduction of size of work group as a covariate was considered as not meaningfully affecting the already established results.

Summary

The analysis in this chapter has centered around the actor's evaluation of his relation with alter(s). Analysis of variance and covariance has been used to test Hypotheses III pertaining to the relation between type of technology and actor's group mean evaluation

Figure 8-3

Mean Evaluation Scores of Supervisors
by Type of Technology



scores; the latter having been derived from factor scores according to factors that were interpreted as competence, normativeness, and integration. The factor scores for the trainee, the co-worker, and the supervisor formed the sets of dependent variables. The socio-technical system of the petroleum industry was regarded as the independent variable, and ethnicity and size of work group were introduced as control variables.

It was hypothesized that different types of technology place different constraints upon the actors. Comparisons of group means by type of technology reveal meaningful differences - a significant finding considering the fact that not inter-industry, but within-industry comparisons are made. Six of the nine hypotheses were supported by the data.

The competence and integration hypotheses pertaining to the trainee were substantiated by the finding that craft technology provides the most conducive, but drilling technology the least conducive work milieu. The normativeness hypothesis pertaining to the trainee was not supported by the data; drilling technology lends itself to a more positive evaluation of the supervisor than is the case in craft and continuous process technologies.

For the co-workers, the competence and normativeness hypotheses were substantiated by the finding that in craft technology trainees are given the lowest evaluation, whereas in drilling technology trainees are considered as most competent and normative. The integration hypothesis pertaining to co-workers was only partly substantiated by the data, since it was found that trainees in craft technology are considered by their co-workers as the most highly integrated. However, trainees in drilling technology receive a higher (though below the grand mean) evaluation than do those in continuous process technology.

The normativeness and integration hypotheses pertaining to the supervisor's evaluation of the trainee were substantiated. Trainees in craft technology were evaluated as most normative and integrated, followed by continuous process trainees and by the negative evaluation of those in the drilling technology. The competence hypothesis was not supported by the data, since trainees in the drilling technology rated as the most competent group.

In conclusion, going beyond the conventional method of inter-industry comparison as representing specific types of technology, the within-industry comparisons of the petroleum industry here reported suggest that studies of this industry should emphasize the craftsman more than the operator. The analyses which have been discussed suggest evidence that it is primarily the craftsman's positive evaluation of his work situation that gives the petroleum industry such high ratings compared to other industries.

Chapter 9

SUMMARY AND CONCLUSIONS

Historically, interested native residents of the Northwest Territories of Canada had neither the opportunity nor the skills to partake in the economic activity taking place around them, with the exception of activities related to living off the land. Under the economic conditions prevailing at this time in the North, more northerners are now opting for wage employment.

Barriers remain, however, with regard to the participation of the natives in the wage-oriented labour force; lack of educational and training facilities in local regions, lack of job opportunities in local settlements, and ties to traditional economic activities, at least on a part-time or seasonal basis, are major contributors to the low employment rate of northerners.

In 1973, a consortium of oil companies (Canadian Arctic Gas Study Limited) in co-operation with the territorial and federal governments, introduced a formalized Northern Training Program to train a group of more than one hundred Inuit, Indians, and Whites of different cultural backgrounds, primarily from the Northwest Territories of Canada in certain semi-skilled, skilled, and clerical occupations which would be needed for the commercial development and transmission of gas deposits in the North. Since training facilities for most of the occupations do not yet exist in the North, the Northern Training Program recruits, selects, and relocates northerners from their home communities for industrial training purposes on a semi-permanent basis.

In the context of evaluative research, these trainees were asked some 110 questions about their educational background, work history, and previous exposure to the South, and about their attitudes towards the work organization, their job, and their work associates. Their co-workers and immediate supervisors were also questioned, primarily about the trainees' attitudes towards their job and their work associates.

The objective of this dissertation is to interpret the specific set of data obtained, as a reflection of a general sociological theory. For this purpose, the background of the trainees was conceptualized in the framework of sociology of ethnic relations; the work milieu was interpreted as an instance of the socio-technical system as elaborated by industrial sociology; and the attitudes of the trainees, their co-workers, and supervisors were interpreted as instances of evaluative orientation as developed by Parsons and Jung. To transform the raw data into formal theoretical constructs, factor analysis was employed as a method particularly suited for conceptual and theoretical inductive generalization.

The socio-technical system of the petroleum industry was regarded as a system of independent variables, and the evaluative orientation of the trainee, his co-workers, and his supervisor as a set of dependent variables. Ethnicity of the trainee and size of the work group were regarded as control variables in the analysis of evaluative content of the trainee and his work associates.

The Northern Training Program is by necessity selective in its recruitment of trainees. It attracts primarily northerners who are young, single, fairly well educated, and of various ethnic backgrounds.

Inuit trainees are recruited primarily from their northern home regions, the Arctic, and the Meckenzie Delta. They have achieved less education and have had less exposure to the South than have other ethnic trainees.

Indian trainees are recruited from all regions except the Arctic, have a higher educational level, and have been more frequently exposed to the South than the Inuit.

White trainees come from larger centers, such as Whitehorse, Yellowknife, Fort Smith, and Frobisher Bay, have a higher general level of education and have had most southern experience as compared to the other ethnic groups.

Since ethnicity explains most of the variations in the background attributes of the northern trainees, it has been introduced as a control variable in the analysis of variance.

Northern trainees have been relocated mainly to Alberta and Saskatchewan, or they are flown to the Mackenzie Delta drilling sites on a two-week in, one-week out basis. The locations of the training sites are determined partly by the availability of regional operations of participating companies and partly by the companies' decision to select sites that are considered to be most congenial for the training of northerners.

The training occupations available to northerners have been described within the socio-technical system theory. Accordingly, these occupations have been located within one of the types of technology of the petroleum industry: continuous process, craft, drilling, and clerical technology.

Socio-technical system theory postulates the close interdependence of the technical system and the social system. The types of technology employed in industrial organizations have an important effect on their social structure, the co-ordination of work processes, the means by which these are accomplished and on the worker's orientation towards the organization, his work associates and his work.

Traditionally, the petroleum industry has been described as an example of continuous process technology. By distinguishing between continuous process, craft, drilling, and clerical technologies within the petroleum industry, the analysis in this dissertation goes beyond this conventional view.

Continuous process technology is the most highly automated form of manufacturing. It is the liquid or gaseous nature of the raw materials that allows full automation of the process. The technological structure separates the operator from the direct production process and from the quantity of output. His performance is related to the production process only indirectly as he has some control over the quality of output by monitoring the automated processes and equipment, requiring a relatively low degree of skill, but a relatively high degree of responsibility. Therefore, an elaborate system of superior and subordinate ranks is part of the formal structure, and continuous consultation with supervisors, engineers, chemists, and other technical specialists is essential for the smooth operation of the plant or compressor station. As monitoring the automated processes and equipment need be done only periodically, requiring great care and responsibility - for mistakes are extremely costly - the operation seems to be overstaffed during periods of regular operation, although all these men are needed in crisis situations to solve the problem in an effort to return operations to normal as expediently as possible. The lack of pressure to perform according to a rigid time schedule and the time available for leisure activity at work make informal interaction easily possible and encourage the development of integration. The free association among co-workers is encouraged by management to a certain extent as it ensures the successful operation of the plant or station because of the interdependence of the work group.

Craft technology within the petroleum industry is essential for the maintenance and repair of the sophisticated electronic and heavy equipment of the automated process production system. The maintenance man, a craftsman, requires a high level of traditional skills and responsibility, which is usually acquired during apprenticehip when craftsmanship values are internalized. Craft technology has been characterized by its high degree of control over the technical environment. Repairs and maintenance of costly equipment cannot be carried out under pressure, hence the craftsman is in a position to choose the speed of work and the sequence of operations he performs. As craftsmen frequently work in teams, this situation not only makes the men rely upon each other's competence, but it also fosters integration. It has been argued that craft technology within the petroleum industry is the most favourable type of technology according to worker evaluation, as it provides not only the advantages of belonging to a trade - a favourable situation by itself - but also to a very attractive industry as compared to craftsmen in other industries.

The geographical and climatic conditions of the Arctic, the camp life, and the nature of the drilling technology foster a distinct work orientation amongst drilling employees. The work process in the drilling technology differs from that of the continuous process technology in one fundamental aspect: the group members have control over the entire production process. It differs from the craft technology in the team approach that makes it impossible for one team member to compensate for the incompetence of another.

Within the drilling technology, various occupations are open to the northern trainee though most of the trainees are employed as roughnecks or are in training to be one. During routine drilling, the work situation produces a relaxed atmostphere in which the trainee is fairly self-determinate in his work. During these times, the physical mobility of the trainee who performs different tasks makes direct supervision more difficult. At other times, however, he is under high pressure to perform within a small team. In these instances, the rhythm of work requires a high degree of co-operation of each worker with the other team members to assure the safety and continuous work flow. When working in a team, supervision of the trainee is possible on the immediate level and it is continuous. Though team work requires a high degree of co-operation and loyalty among its members, it is not conducive to integration on account of long working hours, noisy machinery, and the climatic conditions of the Arctic.

The clerical technology was distinguished from the other three types of technology by one major criteria: the clerical employee does not use, repair, or maintain machinery and equipment for the production of technical consumer goods. Comparison with other types of technology was therefore made with caution, and evaluational content was omitted from this dissertation because of the low frequency of workers in this category.

Although socio-technical systems theory has in its major postulate some rudimentary notions of how workers evaluate their situation, it fails to develop a coherent theory of evaluative orientation. In order to explain the specific set of data, the theory of evaluative orientation, originally developed by Parsons and modified by Jung, has been applied to the industrial setting.

Parsons' and Jung's theories are firmly embedded in the sociological tradition that regard an actor as responding to his total environment selectively, thereby taking an active part in constructing his action world.

Starting from Parsons' theory of action, the social system of action has as a reference the actor's orientation to a situation. The situation, however, is subjectively defined by an actor as consisting of objects of orientation which have been conveniently classified into cognitive, cathectic, and evaluative modes of orientation. The term "evaluative" is given by Parsons to the process of selection among alternatives in the cognitive mapping of objects as to what they are or mean to the actor.

Parsons furthermore distinguishes three types of action-orientation: the instrumental, the expressive, and the moral. Starting from classical economic theory of exchange, Parsons applies his ideas of the instrumental and expressive orientation to the relational context of the goal gratification oriented actor, and formulates an instrumental and an expressive complex, but fails to do so for moral orientation.

Within the instrumental complex of action orientation the actor considers alter to be a means towards the exchange of some object or property of an object. A given actor is confronted with four major types of problems of the ordering of his relation to the significant alters: facilities, cooperation, disposal, and remuneration. In this dissertation, I have replaced the term 'remuneration' with 'sanctions'. The latter is considered to be more appropriate as it applies to the settlement of terms of exchange on which the actor receives contributions that may be positive or negative. 'Remuneration' has primarily a connotation of positive reward, whereas 'sanctions' implies positive and negative rewards as well as withdrawal of rewards within the instrumental complex.

According to Parsons, a given actor considers alter within the expressive complex of action orientation as an end or the object in focus. He, in turn, has to be willing to serve as an object. The actor is confronted with four major types of problems homologous to those of the instrumental complex: occasions, expressive loyalty, receptiveness, and response. To achieve more precision in the conceptualization and to separate the expressive from the ethical complex, I have substituted the terms 'expressive loyalty' and 'response' with 'symbolization' and 'representation' respectively.

One significant theoretical contribution of this dissertation to Parsons' types of action-orientation is the development of the ethical complex for Parsons' moral orientation. It is based on Parsons' principle of social exchange and the regulation of the settlement of terms of exchange. The four major types of problems a given actor is confronted with have been conceptualized as privilege, loyalty(-ties), authority, and responsibility.

To go beyond the mere classificatory scheme of the instrumental, ethical, and expressive complexes, Jung's theory of telic orientation was introduced, and its major explanatory principle applied to the above three complexes.

Jung's general theory of action was presented as consisting of three special theories: orientation theory, decision theory, and motivation theory. Within the theory of orientation, Jung postulates twelve systems of discourse that are cross-partitioned into four equivalence classes, producing the epistemic and telic systems on the one hand and the simple and combined systems on the other hand. Jung's six telic systems of discourse (aesthetic, moral, religious, pragmatic, ethical, expressive) have been found to be similar to Parsons' evaluative orientation as they involve a subjectifying transformation of an already constructed epistemic system. Jung's three combined systems of telic orientation (pragmatic, ethical and expressive) are similar in some respects to Parsons' instrumental, moral and expressive types of action-orientation. This similarity makes it possible to locate the instrumental complex in Jung's pragmatic system, the ethical complex in Jung's ethical system, and the expressive complex in Jung's expressive system of orientation.

Jung's theory of telic orientation advances beyond Parsons' conceptualization of the action system by introducing the explanatory principle of reduction of uncertainty. According to that principle, an actor will accept from all available statements such a definition of the action world that has minimum possible uncertainty. Uncertainty is at a relative maximum when an actor cannot define his situation. The actor may comply with or violate his definition of the situation, thereby reducing uncertainty. This principle of reduction of uncertainty leads to the postulation of gradients of uncertainty associated with each system. The actor's minimum uncertainty in the pragmatic system is referred to by Jung as competence, in the ethical system as normative determination, and in the expressive system as integration. An actor, then, defines his situation as more or less competent, normative, or integrative.

The four major types of problem of the instrumental, ethical, and expressive complex carry implicitly the notion towards a solution by reducing the uncertainty of the definition of the situation. The variability of each type of problem and the actor's attempt to solve them (i.e. reduce uncertainty) makes it possible to interpret these as the component concepts of the governing principle of uncertainty. The component concepts of the instrumental complex (facility-ties, cooperation, disposal, sanctions) were formulated as competence; the component concepts of the ethical complex (privilege, loyalty-ties, authority, responsibility) were formulated as normativeness; and the component concepts of the expressive complex (occasions, symbolization, receptiveness, representation) were formulated as integration. Competence, normativeness, and integration were considered as constructs that are lexically defined within the theory of evaluative orientation. Their relations to each other were stated as propositions, applying to the trainee's, the co-worker's, and the supervisor's evaluative orientation.

The second major contribution of this dissertation to sociological action theory lies in the achievement of combining aspects of Parsons' and Jung's work, permitting empirical testing of the instrumental, ethical, and expressive complex of action-orientation.

Factor analysis was used to establish patterns of interrelationships between component concepts to form factors that have been interpreted as constructs within the theory of evaluative orientation. The theoretical conceptualization placed restrictions on the use of indicators entered into factor analysis, namely that for each component concept at least one indicator was retained. Thus, twelve indicators, each representative of the respective component concepts, were retained and factor analysed, defining the existential class of properties for the trainee, the co-worker, and the supervisor.

By this method, the factors for each respondents group revealed the discriminatory power of the subject's responses, which were treated as variables in their own right. These factors, as empirical concepts, embodied the many characteristics of interrelated sub-characteristics of items that clustered within them. Items of facility-ties, cooperation, disposal, and sanctions clustered in one factor; privilege, loyalty-ties, authority, and responsibility clustered in a second factor; and occasions, symbolization, receptiveness, and representation clustered in a third factor. These factors were therefore interpreted as constructs defining the specific uncertainty gradients of competence, normativeness, and integration respectively. The interpreted factors then were assumed to explain the underlying observed patterns. Hypotheses I were thus supported - namely, that the actor's gradient of uncertainty is not unidimensional, but can be formally separated according to the pragmatic, the ethical, and the expressive systems of orientation.

A third major contribution to action theory has been made by not only assuming that different situations place different constraints on the actor, affecting the formal structure of the three evaluative combined systems, but actually empirically testing the variability of that formal structure within the industrial setting. It was therefore hypothesized that continuous process, craft, drilling, and clerical technologies successively produce a degenerative pattern of the above established factor structure when the same items are factor analysed separately according to these types of technology.

Among trainees and co-workers in the continuous process technology, the resulting three factors were interpreted as competence, normativeness, and integration, because all items clearly clustered in the three factors as predicted. However, among supervisors some items crossloaded on two factors, thus reflecting some blurring of the pattern. This was explained as reflecting some degeneration of the formal structure.

In craft technology, the trainee's factor structure remained similar to that exhibited in continuous process technology. The factor structure of the co-workers and supervisors, however, showed degeneration in that some items crossloaded and still others loaded on dimensions differing from the conceptualization. In fact, among supervisors, two factors were sufficient to explain most items of the evaluative orientation.

Among actors in drilling technology, the degenerative process was still more pronounced. The items of trainees clustered into factors that were remnants of normativeness and integration. The third factor was termed cooperation, as it was dominated solely by that particular item. Among co-workers in the drilling technology, the constructs' labels were retained, though not only crossloadings of several items were present, but in addition some items contributed to other than expected factors. The results for supervisors within the drilling technology showed most of the degeneration. Integration was the only construct that could be clearly defined for supervisors. Again, two factors were sufficient to explain the supervisor's evaluative orientation.

Finally, in the clerical technology, the factors of trainees' evaluation could not be defined in the conceptual scheme. Among co-workers, all items entered into factorial analysis were unity. This result was interpreted as the possibility that the selected items were a poor sample of the domain under investigation. The factor structure of the supervisors, however, was less degenerative than was the case in the drilling technology, and the constructs of competence, normativeness, and integration were discernable.

The above findings, therefore, led to the acceptance of the Hypotheses II for the trainees and co-workers, but not for the supervisors.

In order to examine the factual content of the actor's evaluative orientation, factor analysis was employed as a method for reducing the complexity of the data. All entered variables were grouped into scales according to factors by transforming subject responses into factor scores. These factor scores for the trainee, the co-worker, and the supervisor formed the sets of dependent variables. The socio-technical system of the petroleum industry was regarded as the independent variable, and ethnicity and size of work group as the control variables in the analyses of variance and covariance to test Hypotheses III. Multiple classification analysis scores were examined and the pattern of changes in the group means of the dependent variables were examined.

The trainees' relatively high satisfaction with the employing companies in the craft technology, followed by the continuous process trainees, and at a distance by the trainees in the drilling technology, was seen to reflect the different working conditions these trainees are exposed to within the same industry. It is not surprising that craft-trainees feel most satisfied. They enjoy flexibility, autonomy, and physical mobility on the job over and above the generally favourable work milieu of the petroleum industry. By contrast, the drilling technology offers hardships and hard, dirty labour in the hostile environment of the Arctic with some, though apparently not sufficient, compensations made on part of the employer.

Evaluation of the trainee's competence by co-workers and supervisors showed that both groups evaluate the trainees in the drilling technology as most competent, and those in craft technology as least competent. An expost facto explanation has been advanced, suggesting that the more complex the facility and skill requirement in a particular technology, the greater the difference between trainee's competence and standards to be achieved. Therefore, work associates evaluate the trainee in the highly skilled craft technology as less competent than they do the trainee in the continuous process technology, with the difference being even more obvious in the semi-skilled drilling technology.

The findings of trainee's evaluation about his relation with the supervisor are opposed to the direction which was predicted. Trainees in the drilling technology evaluate their relation with the supervisor most positively, a fact that has been explained in terms of the underlying principle that the supervisor is accepted as part of the work crew and supervision is not considered to be arbitrary. The supervisor's normative evaluation of the trainee, however, showed a reversed pattern: trainees in craft technology were evaluated as most normative and those in drilling technology as least normative. The supervisor most removed from daily contact with the trainee gives the most positive evaluation, whereas the trainee does not. Two different principles seem to be operative here, neither of which could be tested by the data available. Co-worker's evaluation of the trainee exhibits a pattern similar to that of the trainee's evaluation.

On the integration dimension, the co-worker's and supervisor's evaluative orientation towards the trainee exhibited the most consistent pattern. Craft technology within the petroleum industry was considered as the most conducive technology for integration, followed by continuous process. Within the latter technology, however, the co-workers accorded the trainees the lowest score, evaluating trainees within the drilling technology as somewhat more integrated. In general, however, evaluations given on integration in the drilling technology were all negative when compared to the grand mean. This low rating on integration at drilling sites was considered to be a significant finding, inasmuch as it demonstrates that team work does not produce integration in that particular type of technology.

On the whole, the mean evaluation scores of the supervisors were more moderate in their deviations from the grand mean than those of the trainees and the co-workers. This was believed to be a reflection of the supervisor being seen as an office holder, as well as his reliance on secondary information channels in his evaluation of the trainee.

The theory of evaluative orientation combined with the theory of the socio-technical system has significantly contributed to the study of the actor's evaluation of alters within the industrial setting. The industrial situation sets constraints upon the actor that produce the major gradients of uncertainty which the actor attempts to minimize in defining his action world. In addition, continuous process, craft, drilling, and clerical technologies within the petroleum industry are sub-sets of industrial situations, generating uncertainty differently.

Ethnicity of the trainee was found to not only have an effect on the trainee's evaluation of his work situation, but also on his work associates' evaluation of him. Ethnicity, as an attribute of the northern trainee, therefore, was found to affect the trainee's co-workers' and supervisor's definition of the situation in some measures of uncertainty, but not in others.

The introduction of size of work group as a covariate has not established additional meaningful differences in the group means, except in the case of the trainee's integrative evaluation. Though size of work group is used as a structural indicator for integration in several studies of industrial sociology, group size variations within the petroleum industry are considered too insignificant to produce a pronounced effect.

SYNOPSIS

The objective of this dissertation has been to interpret a specific set of data as a reflection of a general sociological theory. To achieve this objective, the interrelationship between theory and methodology has been stressed. Going beyond the presentation of facts, the theory of evaluative orientation has been introduced to explain the phenomenon within action theory, as developed by Parsons and Jung.

Parsons provides a fruitful classificatory scheme of the actor's evaluative orientation by postulating the instrumental, the moral, and the expressive types of action-orientation to the structure of a particular role. Within his system, different types of action-orientation assume primacy in different situations. Parsons' instrumental and expressive complexes conceptualize the actor's evaluative orientation according to systems of roles (social exchange) within the instrumental and expressive types of action-orientation respectively. Furthermore, four major types of problems within each complex of ordering the actor's relations to significant alters specify major criteria of the social exchange system. The additional development in this dissertation of the ethical complex for Parsons' moral action-orientation, based on the same principles of social exchange as those of the instrumental and expressive complexes, make the classificatory scheme complete.

Parsons' concern with the development of a conceptual system of evaluative orientation leaves the methodological and theoretical issues aside. What Parsons does is to order and specify class concepts within the conceptual space by assigning class elements to their appropriate sets.[1] The result is at best categorical propositions about the actor's inclusion (or exclusion) in a particular set. As an attempt at producing a synthetic-universal system, the conceptual scheme (though modified) is not sufficient to assess the states and processes of evaluative orientation of a particular exchange system. The conceptual system remains to be combined with the concrete system (through concept operationalization) and the conceptual system must be combined with a formal system (to allow for interpretation and explanation).

---

[1] "Set" is used here in the set theory sense as any collection of entities. On the conceptual level, set refers to the collection of entities according to some abstracted common property.

In order to explain an actor's evaluative orientation Jung's explanatory principle governing the process of orientation was introduced. This principle has explanatory power in predicting that an actor will seek states within different situations that minimize his uncertainty. To Jung, orientation is multi-dimensional and subject to situational constraints.

Accepting the principle of reduction of uncertainty, the four major types of problems of the instrumental, the ethical, and the expressive complexes were transformed into component concepts while their values and relations were formally (mathematically) specified by factor analysis. The resulting factors were interpreted as constructs of the actor's evaluative orientation. These constructs (competence, normativeness, and integration) are not attributes of alter but have been defined as relational constructs.

Data from an industrial setting provided the empirical context as the particular situation in which the conceptual scheme could be empirically tested. The conception of industrial settings as sociotechnical systems was relevant, helping in the selection of indicators and in conceptualizing the different situations of the actor within an industry by types of technology.

The multi-dimensional orientation of the worker and his varied relations to specific industrial situations has far reaching implications. For instance, the Department of Manpower and Immigration with the assistance of private industry has established an on-the-job training program to alleviate a shortage of skilled workers in certain jobs. The subsidization of the Northern Training Program is only an insignificant part of its budget spent for such on-the-job training programs. It is commonly assumed that only competence or skill is relevant to evaluation of the performance of trainees, and indeed of mature workers. However, this dissertation has demonstrated the existence of three salient orientations in the worker toward his work situation: competence, normativeness, and integration. Thus there are other factors to be considered which are indeed recognized by the man in the street - such as the trainee's ability to accept authority, to take responsibility, and his acceptance in the work group - which are aspects of normativeness and integration respectively. Improved on-the-job training programs should seek to advance the trainee in all respects relevant to his performance in the total work situation, his ability to relate to others which will facilitate his integration into the work group, his identification with the norms of his trade, as well as his mastery of relevant skills.

The Department of Manpower and Immigration does attempt to alleviate the problems an individual may encounter in the on-the-job training program by its Basic Job Readiness Training Program. However, there exists at present no orientation explicitly or implicitly toward the formal and the informal expectations in regard to the norms and the patterns of association that exist among various categories of workers. Even less is there any attempt to help the worker to adapt to these features which are intrinsic very important to his adjustment to the new work situation. Such information, however, would enhance the placement of potential trainees, as it provides a more accurate understanding of the total work situation.

As different jobs are found in different socio-technical systems, the specific constraints operating have to be known not only for successful training but alos for proper placement of personnel. Going beyond a specific industry, the craft technology for instance requires a merging of competence with normativeness as expressed in craftsmanship. Integration, however, is determined by the specific employment condition. The craft technology within the petroleum industry demands different integrative requirements than does a small company that makes use of its craftsmen to work independently on different work sites.

Once the requirements of a specific occupation, and the situational context are known, the on-the-job training can be improved. But in addition, the selection of potential trainees for specific occupations can be improved. Rather than basing the selection on the aptitude of the applicant, additional information is required to assess the suitability of an individual for a particular position. In this dissertation the background characteristics were limited to ethnicity. In the general work context,however, additional information is paramount. Data on employment history, work ethic, and relationships with former work associates all have important relevance to the selection process that is frequently underestimated. The selection procedure, therefore should produce information on the characteristics of an applicant on competence, normativeness and integration, and placements should be made according to particular situations as well as to specific occupations. The selection process, then, requires a balance of all these factors of the individual's potential characteristics matching these with the specific industrial context.

The two major emphases of this dissertation are that the actor's evaluative orientation is multi-dimensional, and that different situations are characterized by different patterns of uncertainties. The validity of these propositions has been tested and supported in different socio-technical contexts within the petroleum industry, using different categories of personnel.

BIBLIOGRAPHY

BIBLIOGRAPHY

Abell, Peter
1971 Model Building in Sociology. London: Cox and Wyman Ltd.

Blalock, Hubert, M., Jr.
1970 An Introduction to Social Research. Englewood Cliffs, N.J.: Prentice-Hall, Inc.

Blalock, Hubert, M., Jr.
1972 Social Statistics. New York: McGraw-Hill Book Co.

Blauner, Robert
1967 Alienation and Freedom. Chicago: University of Chicago Press.

Bridgman, Percy W.
1927 The Logic of Modern Physics. New York: Macmillan.

Caplow, Theodore
1964 Principles of Organization. New York: Harcourt, Brace & World, Inc.

Cardinal, Harold
1969 The Unjust Society. Edmonton: M. G. Hurtig Ltd.

Elliott, Jean Leonard (ed.)
1971 Minority Canadians 1 - Native Peoples. Scarborough, Ont.: Prentice-Hall of Canada Ltd.

Emery F. E. and E. L. Trist
1958 "Socio-Technical Systems." Pp. 418-424 in Charles Walker (ed.), Modern Technology and Civilization. New York: McGraw-Hill Book Company, Inc.

Faunce, W.
1965 "Automation and the Division of Labor." Social Problems 13: 149-160.

Fowler, William
1972 "The Development of Competence and Deficit and Some Canadian Perspectives." Pp.90-114 in Thomas J. Ryan (ed.), Poverty and the Child. Toronto: McGraw-Hill Ryerson Ltd.

Frideres, James S.
1974 Canada's Indians: Contemporary Conflicts. Scarborough, Ont.: Prentice-Hall of Canada Ltd.

Fullan, Michael
1971 "Industrial Technology and Worker Integration in the Organization." Pp. 350-361 in W. E. Mann (ed.), Canada: A Sociological Profile. Toronto: The Capp Clark Publishing Company.

Gemini North Ltd.
1974 Social and Economic Impact of Proposed Arctic Gas Pipeline in Northern Canada. 4 Vols.

Government of Canada. Departments of Indian Affairs and Northern Development and Energy, Mines and Resources.
1972 "Expanded Guidelines for Northern Pipelines." June 28, 1972.

Hawthorn, H. B. (ed.)
1967 A Survey of the Contemporary Indians of Canada. 2 Vols. Ottawa: Queen's Printer.

Hobart, Charles
1974 Employee Adjustment and Effectiveness: Arctic Oil Explorations of Gulf Oil Canada 1973-74. Volume I. Edmonton: Westrede Institute.

Hobart, Charles assisted by Gunter Baureiss
1975 An Evaluation of a Training Program. Calgary, Edmonton: NORTRAN.

Jenness, Diamond
1918 "The Eskimo of Northern Alaska: A Study of the Effect of Civilization." Geographical Review 5 (Feb. 1918):89-101.

Jung, Richard
1965 "Systems of Orientation." Pp. 67-93 in Manfred Kochen (ed.), Some Problems in Information Science. New York: The Scarecrow Press.

Mann, F. and L. Hoffman
1960 Automation and the Worker. New York: Holt, Rinehart and Winston.

Nie, Norman H., Dale H. Bent, and C. Hadlai Hull
1975 Statistical Package for the Social Sciences (SPSS). New York: McGraw-Hill Book Company.

Parsons, Talcott, and Edward A. Shils (eds.)
1962 Toward a General Theory of Action. New York: Harper & Row, Publishers, Inc.

Parsons, Talcott
1964 The Social System. New York: The Free Press of Glencoe.

Porter, John
1967 The Vertical Mosaic. Toronto: The University of Toronto Press.

Rosenberg, Morris
1968 The Logic of Survey Analysis. New York: Basic Books, Inc.

Rummel, R. J.
1970 Applied Factor Analysis. Evanston: Northwestern University Press.

Searles, Herbert L.
1956 Logic and Scientific Methods. New York: The Ronald Press Company.

Sheffe, Norman
1970 Canada's Indians. Toronto: McGraw-Hill Company of Canada Ltd.

Touraine, Alain
1962 "An Historical Theory in the Evolution of Industrial Skills." Pp. 425-436 in Charles R. Walker, Modern Technology and Civilization. New York: McGraw-Hill Book Company, Inc.

Trist, E. A., and K. W. Bamforth
1951 "Some Social and Psychological Consequences of the Longwall Method of Coal-getting." Pp. 345-369 in D. S. Pugh (ed.), Organization Theory. Baltimore: Penguin Books Inc.

Williamson, Robert
1974 Eskimo Underground: Socio-Cultural Change in the Canadian Central Arctic. Uppsala: Almquist Wiksell.

Whittaker, C. E.
1937 Arctic Eskimo: A Record of Fifty Years Experience and Observation Among the Eskimo. London:

Woodward, Joan
1970 Industrial Organization: Theory and Practice. Oxford: Oxford University Press.

APPENDICES

APPENDIX A

ABRIDGED INTERVIEW SCHEDULES

ARCTIC GAS TRAINEE INFORMATION SUMMARY

PERSONAL:

Name in full ______________________________

Name normally used _________________________

Social Insurance Number __________ Health Care Number ___________

Birth Date _____ Indian __ N/S Indian __ Eskimo __ White __ Other __

Northern address ___________________________________

Marital status: M ___ S ___ D ___ Number of dependents __________

Date entered program ___________ Terminated ________________

EDUCATIONAL:

Highest grade successfully completed __________ Year __________

Post secondary education (university, technical, vocational) __________

____

Apprenticeship: Trade __________ Began ______ Completed _______

Trade __________ Began ______ Completed _______

Journeyman's Certificate: Trade _________________ Year _______

Trade _________________ Year _______

EMPLOYMENT:

C.A.G.S.L. Current:

DACUM Chart No. ______ No. of Skills ______ Position __________

Employer __________________ Location ____________________

Supervisor _____________ Date present assignment commenced _____

C.A.G.S.L. History:

Employer	From	To	Position
____________________	___	___	____________________
____________________	___	___	____________________
____________________	___	___	____________________

History:

Employer	From	To	Position
____________________	___	___	____________________
____________________	___	___	____________________
____________________	___	___	____________________

DATA INPUT: Date _____________ Initials ___________

ABRIDGED TRAINEE'S INTERVIEW SCHEDULE

Background

How many times have you been in Southern Canada before you became a (CAGSL) trainee? Don't count hospitalization and short trips.

Have you ever had a job in Southern Canada before you became a (CAGSL) trainee? If yes, for how many months did you work in the South?

How many people work together in your crew (group)?

Trainee's Evaluation

Do you get lonely on the job?
(Supplementary question: What are the reasons?)

How often have you felt like quitting and going home?
(Supplementary question: What incidences make you feel that way?)

Do you think you will stay in the program for at least another year?
(Supplementary question: Why do you think you may stay or leave?)

Are you satisfied with your pay and other benefits?
(Supplementary question: If not, what are you dissatisfied about?)

Do you feel that the field foreman (or supervisor) is patient about showing you things on the job?

How well do you get along with your field foreman (supervisor)?

Does your field foreman (supervisor) very often tell you to do jobs that you do not consider part of your training?

Does the field foreman spend more time with you than with other workers?

Do you find the work crew indifferent towards you?

Do you find the work crew friendly towards you?

Do you find the work crew helpful in getting ahead as a trainee?

How many of the crew seem to accept you as one of them?

ABRIDGED CO-WORKER'S INTERVIEW SCHEDULE

Co-Worker's Evaluation

Do you find the trainee is a fast learner?

Do you find the trainee cooperative as a worker?

I have to work harder because of the northern trainee.

How do you feel about the trainee's working skill?

I prefer the trainee's company to working alone.

Do you find the trainee is interested in the operation?

Do you find the trainee is trying hard to do well?

How do you feel about the trainee's responsibility?

Do you find the trainee friendly?

Do you find the trainee outgoing - shy?

Do you find the trainee considerate?

How do you feel about the trainee's acceptance by the working companions (acceptance by crew)?

ABRIDGED SUPERVISOR'S INTERVIEW SCHEDULE

Supervisor's Evaluation

How fast does the trainee learn?

Do you find the trainee is motivated to learn?

Do you find you treat the trainee differently from the way you treat other workers?
(Supplementary question: If different, in which ways?)

How do you find the trainee's working skill?

Has the trainee been unpunctual about coming to work, or absent from work during the last six months without good excuse?
(Supplementary question: If yes, how many times?)

Do you have any problem in communicating with him?

How do you find the trainee to supervise?
(Supplementary questions: Has he ever refused to do a particular job that he was told to do? For what reason?)

Do you find the trainee to be a responsible and reliable person on the job compared to the other workers?

Is the trainee hard to get to know?

Is the trainee friendly?

Is the trainee considerate?

How do you think he fits into your work group?

APPENDIX B

SUPPLEMENTARY TABLES

Table 1

Home Residence at Time of Recruitment of Continuing and Terminated Trainees

Home Residence	Continuing		Terminated		Total	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
Arctic & Northern Yukon						
Bathurst Inlet	1	1.3	-	0.0	1	0.9
Coppermine	5	6.5	4	11.8	9	8.1
Frobisher Bay	1	1.3	-	0.0	1	0.9
Old Crow	2	2.6	1	2.9	3	2.7
Sachs Harbour	1	1.3	-	0.0	1	0.9
Mackenzie/Delta						
Aklavik	5	6.5	4	11.8	9	8.1
Inuvik	8	10.4	3	8.8	11	9.9
Ft. McPherson	4	5.2	5	14.7	9	8.1
Tuktoyaktuk	2	2.6	6	17.6	8	7.2
Mackenzie Central						
Norman Wells	6	7.8	2	5.9	8	7.2
Ft. Norman	2	2.6	-	0.0	2	1.8
Ft. Franklin	1	1.3	1	2.9	2	1.8
Southern N.W.T. & South Yukon						
Yellowknife	1	1.3	-	0.0	1	0.9
Ft. Providence	5	6.5	1	2.9	6	5.4
Hay River	3	3.9	-	0.0	3	2.7
Ft. Resolution	7	9.1	-	0.0	7	6.3
Ft. Smith	10	13.0	2	5.9	12	10.8
Ft. Simpson	3	3.9	-	0.0	3	2.7
Teslin	1	1.3	-	0.0	1	0.9
Whitehorse	3	3.9	4	11.8	7	6.3
Alberta & British Columbia						
Ft. Vermillion	1	1.3	-	0.0	1	0.9
Ft. Chipewan	1	1.3	-	0.0	1	0.9
Paddle Prairie	1	1.3	-	0.0	1	0.9
Brokett	2	2.6	-	0.0	2	1.8
Ft. Nelson	1	1.3	-	0.0	1	0.9
Total	77	100.0	34	100.0	111	100.0

Table 2

Correlation Coefficients of Trainee's Evaluative Orientation

	Facility(-ties)	Cooperation	Disposal	Sanctions	Privilege	Loyalty(-ties)
Facility(-ties)	1.00000	0.35730	0.34760	0.54001	0.07364	0.03019
Cooperation	0.35730	1.00000	0.40371	0.46924	-0.13364	-0.03204
Disposal	0.34760	0.40371	1.00000	0.39582	-0.03911	-0.11183
Sanctions	0.54001	0.46924	0.39582	1.00000	0.02459	-0.13305
Privilege	0.07364	-0.13364	-0.03911	0.02459	1.00000	0.42383
Loyalty(-ties)	0.03019	-0.03204	-0.11183	-0.13305	0.42383	1.00000
Authority	0.25689	0.11898	0.12928	0.08117	0.26065	0.46798
Responsibility	-0.13968	-0.05692	-0.08231	-0.03145	0.43217	0.47057
Occasions	0.07852	0.13108	0.03803	-0.05257	0.22387	0.17853
Symbolization	-0.07748	-0.04171	0.12252	-0.17011	0.23676	0.09796
Receptiveness	0.13471	0.08224	0.05584	0.00550	0.05637	-0.01355
Representation	0.00688	-0.07290	0.03591	-0.21814	0.00377	0.01542

	Authority	Responsibility	Occasions	Symbolization	Receptiveness	Representation
Facility(-ties)	0.25689	-0.13968	0.07852	-0.07748	0.13471	0.00688
Cooperation	0.11898	-0.05692	0.13108	-0.04171	0.08224	-0.07290
Disposal	0.12928	-0.08231	0.03803	0.12252	0.05584	0.03591
Sanctions	0.08117	-0.03145	-0.05257	-0.17011	0.00550	-0.21814
Privilege	0.26065	0.43217	0.22387	0.23676	0.05637	0.00377
Loyalty(-ties)	0.46798	0.47057	0.17853	0.09796	-0.01355	0.01542
Authority	1.00000	0.29937	0.15066	0.10844	-0.00962	0.22981
Responsibility	0.29937	1.00000	0.11691	0.10168	-0.03443	0.01399
Occasions	0.15066	0.11691	1.00000	0.50303	0.69176	0.30380
Symbolization	0.10844	0.10168	0.50303	1.00000	0.53215	0.31896
Receptiveness	-0.00962	-0.03443	0.69176	0.53215	1.00000	0.41571
Representation	0.22981	0.01399	0.30380	0.31896	0.41571	1.00000

Table 3

Correlation Coefficients of Co-Worker's Evaluative Orientation of Trainees

	Facility(-ties)	Cooperation	Disposal	Sanctions	Privilege	Loyalty(-ties)
Facility(-ties)	1.00000	0.72041	0.52488	0.61949	0.23625	0.31400
Cooperation	0.72041	1.00000	0.53132	0.67843	0.32344	0.37216
Disposal	0.52488	0.53132	1.00000	0.63852	0.27669	0.35794
Sanctions	0.61949	0.67843	0.63852	1.00000	0.32025	0.38785
Privilege	0.23625	0.32344	0.27669	0.32025	1.00000	0.68123
Loyalty(-ties)	0.31400	0.37216	0.35794	0.38785	0.68123	1.00000
Authority	0.46988	0.52103	0.30348	0.54535	0.67480	0.82174
Responsibility	0.41121	0.52760	0.33652	0.45082	0.71421	0.75230
Occasions	0.05706	0.00510	-0.03726	-0.14325	-0.13490	-0.06216
Symbolization	0.29126	0.27220	0.20651	0.21060	0.09227	0.26583
Receptiveness	0.32633	0.38715	0.29244	0.24824	0.32315	0.35789
Representation	0.37822	0.37376	0.23366	0.24440	0.23295	0.30065

	Authority	Responsibility	Occasions	Symbolization	Receptiveness	Representation
Facility(-ties)	0.46988	0.41121	0.05706	0.29126	0.32633	0.37822
Cooperation	0.52103	0.52760	0.00510	0.27220	0.38715	0.37376
Disposal	0.30348	0.33652	-0.03726	0.20651	0.29244	0.23366
Sanctions	0.54535	0.45082	-0.14325	0.21060	0.24824	0.24440
Privilege	0.67480	0.71421	-0.13490	0.09227	0.32315	0.23295
Loyalty(-ties)	0.82174	0.75230	-0.06216	0.26583	0.35789	0.30065
Authority	1.00000	0.78453	-0.09886	0.31128	0.38000	0.32680
Responsibility	0.78453	1.00000	-0.07705	0.18900	0.45458	0.34859
Occasions	-0.09886	-0.07705	1.00000	0.29066	0.23419	0.31985
Symbolization	0.31128	0.18900	0.29066	1.00000	0.56395	0.72133
Receptiveness	0.38000	0.45458	0.23419	0.56395	1.00000	0.75058
Representation	0.32680	0.34859	0.31985	0.72133	0.75058	1.00000

Table 4

Correlation Coefficients of Supervisor's Evaluative Orientation of Trainee

	Facility(-ties)	Cooperation	Disposal	Sanctions	Privilege	Loyalty(-ties)
Facility(-ties)	1.00000	0.28605	0.46258	0.36380	0.24418	0.16281
Cooperation	0.28605	1.00000	0.32798	0.39198	0.12173	0.20205
Disposal	0.46258	0.32798	1.00000	0.45228	0.17295	0.31885
Sanctions	0.36380	0.39198	0.45228	1.00000	0.26983	0.16292
Privilege	0.24418	0.12173	0.17295	0.26983	1.00000	0.25678
Loyalty(ties)	0.16281	0.20205	0.31885	0.16292	0.25678	1.00000
Authority	0.19313	0.26878	0.28797	0.28231	0.21362	0.32463
Responsibility	0.34708	0.32623	0.41687	0.34193	0.50614	0.42787
Occasions	0.21351	0.23648	0.25373	0.09728	0.03937	0.17101
Symbolization	0.13900	0.10556	0.18998	0.13691	0.23186	0.22676
Receptiveness	0.22184	0.19473	0.28005	0.20881	0.12649	0.17265
Representation	0.34921	0.31650	0.36230	0.37928	0.19093	0.32258

	Authority	Responsibility	Occasions	Symbolization	Receptiveness	Representation
Facility(-ties)	0.19313	0.34708	0.21351	0.13900	0.22184	0.34921
Cooperation	0.26878	0.32623	0.23648	0.10556	0.19473	0.31650
Disposal	0.28797	0.41687	0.25373	0.18998	0.28005	0.36230
Sanctions	0.28231	0.34193	0.09728	0.13691	0.20881	0.37928
Privilege	0.21362	0.50614	0.03937	0.23186	0.12649	0.19093
Loyalty(-ties)	0.32463	0.42787	0.17101	0.22676	0.17265	0.32258
Authority	1.00000	0.51877	0.12260	0.27468	0.17406	0.32117
Responsibility	0.51877	1.00000	0.17516	0.24671	0.19383	0.31842
Occasions	0.12260	0.17516	1.00000	0.35473	0.55825	0.37534
Symbolization	0.27468	0.24671	0.35473	1.00000	0.52784	0.47823
Receptiveness	0.17406	0.19383	0.55825	0.52784	1.00000	0.50411
Representation	0.32117	0.31842	0.37534	0.47823	0.50411	1.00000

Table 5

Factor Structure of Trainee's Evaluative Orientation by Integration, Competence, and Normativeness

Item	Factor 1	Factor 2	Factor 3	h^2
Competence				
Facility(-ties)	0.02659	0.67708	0.07494	0.46475
Cooperation	0.02310	0.61396	-0.03656	0.37882
Disposal	0.06540	0.54494	-0.04663	0.30341
Sanctions	-0.16243	0.77400	-0.01620	0.62572
Normativeness				
Privilege	0.12882	-0.02218	0.58013	0.35364
Loyalty(-ties)	0.03864	-0.07485	0.76877	0.59811
Authority	0.08689	0.21209	0.55233	0.35760
Responsibility	0.01348	-0.11125	0.62303	0.40073
Integration				
Occasions	0.75351	0.09079	0.18370	0.60977
Symbolization	0.64589	-0.06254	0.13711	0.43989
Receptiveness	0.88159	0.12221	-0.08258	0.79896
Representation	0.46817	-0.06875	0.04130	0.22562
Eigenvalue	2.71616	2.36851	1.96741	
Percentage of Variance	22.6	19.7	16.4	
Cumulative Percentage	22.6	42.4	58.8	
Number of Respondents	72			

Table 5a

Factor Structure of Trainee's Evaluative Orientation by Four Factors

Item	Factor 1	Factor 2	Factor 3	Factor 4	h^2
Competence					
Facility(-ties)	0.03020	0.65967	0.01347	0.12271	0.45131
Cooperation	0.03200	0.59843	-0.06614	0.02060	0.36395
Disposal	0.06754	0.52942	-0.09287	0.08089	0.30002
Sanctions	-0.14251	0.83094	0.03342	-0.19609	0.75034
Normativeness					
Privilege	0.14135	-0.00168	0.65638	-0.03964	0.45239
Loyalty(-ties)	0.03214	-0.06552	0.67999	0.24146	0.52602
Authority	0.03554	0.23703	0.44772	0.71801	0.77343
Responsibility	0.01639	-0.09352	0.64915	0.04142	0.43213
Integration					
Occasions	0.76001	0.08922	0.19766	0.00940	0.62474
Symbolization	0.63813	-0.06565	0.13819	0.05142	0.43326
Receptiveness	0.89035	0.11545	-0.06222	-0.04522	0.81196
Representation	0.46859	-0.09888	-0.08239	0.36648	0.37045
Eigenvalue	2.71616	2.36851	1.96741	0.98627	
Percentage of Variance	22.6	19.7	16.4	8.2	
Cumulative Percentage	22.6	42.4	58.8	67.0	
Number of Respondents	72				

Table 6

Factor Structure of Co-worker's Evaluative Orientation by Normativeness, Competence, and Integration

Item	Factor 1	Factor 2	Factor 3	h^2
Competence				
Facility(-ties)	0.17095	0.75408	0.20423	0.63957
Cooperation	0.26624	0.77551	0.17871	0.70424
Disposal	0.18257	0.64673	0.08410	0.45866
Sanctions	0.26764	0.81600	-0.00032	0.73749
Normativeness				
Privilege	0.78525	0.14894	0.01788	0.63912
Loyalty(-ties)	0.83893	0.21069	0.11429	0.76126
Authority	0.81887	0.35944	0.11582	0.81316
Responsibility	0.82058	0.31244	0.12280	0.78605
Integration				
Occasions	-0.14457	-0.06479	0.42818	0.20844
Symbolization	0.12261	0.18149	0.72051	0.56710
Receptiveness	0.31935	0.21307	0.69283	0.62740
Representation	0.20447	0.21079	0.90208	0.89999
Eigenvalue	5.32735	1.99722	1.49621	
Percentage of Variance	44.4	16.6	12.5	
Cumulative Percentage	44.4	61.0	73.5	
Number of Respondents	83			

Table 6a

Factor Structure of Co-Worker's Evaluative Orientation by Four Factors

Item	Factor 1	Factor 2	Factor 3	Factor 4	h^2
Competence					
Facility(-ties)	0.16282	0.75444	0.19981	0.08310	0.64252
Cooperation	0.26069	0.77660	0.17208	0.00152	0.70068
Disposal	0.17491	0.66601	0.07476	-0.10563	0.49090
Sanctions	0.25762	0.81298	-0.00301	0.07876	0.73351
Normativeness					
Privilege	0.79778	0.15935	0.00553	-0.15655	0.68638
Loyalty(-ties)	0.82106	0.22014	0.11298	0.09674	0.74472
Authority	0.84779	0.34834	0.11369	0.37334	0.99240
Responsibility	0.81840	0.32637	0.11352	-0.10306	0.79981
Integration					
Occasions	-0.14082	-0.06403	0.42700	0.00790	0.20632
Symbolization	0.11503	0.17784	0.74503	0.18819	0.63534
Receptiveness	0.32842	0.22499	0.70200	-0.19356	0.68875
Representation	0.20899	0.22186	0.88126	-0.05833	0.87291
Eigenvalue	5.32735	1.99722	1.49621	0.72376	
Percentage of Variance	44.4	16.6	12.5	6.0	
Cumulative Percentage	44.4	61.0	73.5	79.5	
Number of Respondents	83				

Table 7

Factor Structure of Supervisor's Evaluative Orientation by Integration, Competence, and Normativeness

Item	Factor 1	Factor 2	Factor 3	h^2
Competence				
Facility(-ties)	0.14583	0.54682	0.18486	0.35445
Cooperation	0.13848	0.48774	0.17915	0.28917
Disposal	0.18692	0.62177	0.24259	0.48039
Sanctions	0.08217	0.61748	0.21992	0.43639
Normativeness				
Privilege	0.05794	0.14397	0.50686	0.28100
Loyalty(-ties)	0.17976	0.17798	0.45008	0.26656
Authority	0.15145	0.23183	0.50396	0.33066
Responsibility	0.07488	0.31236	0.82471	0.78331
Integration				
Occasions	0.59665	0.19244	0.02687	0.39375
Symbolization	0.63950	-0.00272	0.29635	0.49679
Receptiveness	0.80564	0.17991	0.06327	0.68543
Representation	0.55185	0.38160	0.24818	0.51175
Eigenvalue	4.13058	1.56920	1.17668	
Percentage of Variance	34.4	13.1	9.8	
Cumulative Percentage	34.4	47.5	57.3	
Number of Respondents	101			

Table 7a

Factor Structure of Supervisor's Evaluative Orientation by Four Factors

Item	Factor 1	Factor 2	Factor 3	Factor 4	h^2
Competence					
Facility(-ties)	0.15334	0.57733	0.08825	0.15112	0.38744
Cooperation	0.13227	0.47765	0.22942	-0.02383	0.29885
Disposal	0.18490	0.62601	0.24750	0.03350	0.48845
Sanctions	0.08807	0.61511	0.16658	0.13596	0.43235
Normativeness					
Privilege	0.06393	0.15705	0.23017	0.81207	0.74119
Loyalty(-ties)	0.17054	0.17528	0.45829	0.12632	0.28580
Authority	0.12909	0.20673	0.62957	0.04858	0.45812
Responsibility	0.08842	0.34862	0.64328	0.35595	0.66986
Integration					
Occasions	0.59426	0.18772	0.06300	-0.05286	0.39515
Symbolization	0.63439	0.00249	0.25153	0.15715	0.49042
Receptiveness	0.82086	0.17992	0.03701	0.04445	0.70953
Representation	0.54603	0.37274	0.26417	0.05319	0.50969
Eigenvalue	4.13058	1.56920	1.17668	0.88081	
Percentage of Variance	34.4	13.1	9.8	7.3	
Cumulative Percentage	34.4	47.5	57.3	64.6	
Number of Respondents	101				

APPENDIX C

T.T.F. SUPPLEMENTARY INFORMATION

SUMMARY OF THE MAJOR COMPONENTS OF THE NORTHERN TRAINING PROGRAM

Following is a brief summary of the major components of the Northern Training Program taken from a brochure distributed to trainees and training supervisors at the orientation courses:

1. Information regarding training and employment opportunities consisting of visits by native Supervisor-Counsellors to the smaller communities to inform and discuss with the residents, in terms with which they are familiar, the opportunities available to them. Visits to high schools and Adult Vocational Schools to advise students of training and employment opportunities in the petroleum industry.

2. Recruitment in co-operation with Canada Manpower and territorial governments and whenever possible, native organizations and local band and settlement councils.

3. Selection by experienced Training Task Force staff, and in co-operation with participating companies.

4. Involvement of the territorial governments in the planning and implementation stages in order that they might be aware of a segment of industry's plans and for the resulting impact on training and educational facilities in the North.

5. An orientation program at Fort Smith for trainees to help prepare them for employment in the petroleum industry.

6. Industry Supervisors Seminars at Fort Smith and Yellowknife, with the opportunity for meaningful native input into this learning experience.

7. A training-on-the-job situation which provides for immediate hands-on-experience and adds relevance to skill training at educational training centres when and as required.

8. A career development model which provides both horizontal and vertical mobility and the opportunity to acquire skills which are transferable to other business and industry.

9. Northern Supervisor Counsellors to help with adjustment to an industrial environment and help with trainees' personal concerns.

10. Joint government-industry commitment in financing of the training program.

11. The opportunity of continuing employment with participating companies.

DACUM Sheet for Gas-Plant Operator

	1	2	3	4	5
A	FOLLOW EMERGENCY PROCEDURES		ENFORCE PLANT SECURITY		
B	FOLLOW ORAL AND WRITTEN INSTRUCTIONS	PARTICIPATE IN GROUP TRAINING INSTRUCTIONS	COMMUNICATE WITH 2-WAY RADIOS		
C	FOLLOW SAFETY PROCEDURES	PARTICIPATE IN SAFETY EQUIP. DEMONSTRATIONS			CHECK SAFETY EQUIP.
D	DRIVE VEHICLE		SERVICE VEHICLE		
E	IDENTIFY & LOCATE PLANT SYSTEMS & EQUIPMENT		MAINTAIN ACCURATE LOG SHEETS	OBSERVE OPERATING CONDITIONS	RUN QUALITY TESTS
F	IDENTIFY & LOCATE PLANT SYSTEMS & EQUIPMENT		MAINTAIN ACCURATE LOG SHEETS	OBSERVE OPERATING CONDITIONS	RUN QUALITY TESTS
G	IDENTIFY & LOCATE PLANT SYSTEMS & EQUIPMENT		MAINTAIN ACCURATE LOG SHEETS	OBSERVE OPERATING CONDITIONS	RUN QUALITY TESTS
H	IDENTIFY & LOCATE PLANT SYSTEMS AND EQUIPMENT		MAINTAIN ACCURATE LOG SHEETS	OBSERVE OPERATING CONDITIONS	RUN QUALITY TESTS
J	IDENTIFY & LOCATE PLANT SYSTEMS AND EQUIPMENT		MAINTAIN ACCURATE LOG SHEETS	OBSERVE OPERATING CONDITIONS	RUN QUALITY TESTS
K	IDENTIFY & LOCATE PLANT SYSTEMS & EQUIPMENT		MAINTAIN ACCURATE LOG SHEETS	OBSERVE OPERATING CONDITIONS	RUN QUALITY TESTS
L	IDENTIFY & LOCATE PLANT SYSTEMS & EQUIPMENT		MAINTAIN ACCURATE LOG SHEETS	OBSERVE OPERATING CONDITIONS	RUN QUALITY TESTS
M	IDENTIFY & LOCATE PLANT SYSTEMS & EQUIPMENT		MAINTAIN ACCURATE LOG SHEETS	OBSERVE OPERATING CONDITIONS	RUN QUALITY TESTS

6	7	8	9	10
INTERPRET SCHEMATICS OF PLANT LAYOUT		PASS ON SHIFT INFORMATION		WRITE COMPREHENSIVE REPORTS & MEMOS
ADJUST OPERATING CONDITIONS	CHECK ROTATING EQUIPMENT	CHECK TOWER LEVELS, PRESS. & TEMP.	CHECK LUBRICATION	REACT TO CHANGES IN OPERATING CONDS.
ADJUST OPERATING CONDITIONS	CHECK ROTATING EQUIPMENT	CHECK TOWER LEVELS, PRESS. & TEMP.	CHECK LUBRICATION	REACT TO CHANGES IN OPERAING CONDITIONS
ADJUST OPERATING CONDITIONS	CHECK ROTATING EQUIPMENT	CHECK TOWER LEVELS, PRESS. & TEMP.	CHECK LUBRICATION	REACT TO CHANGES IN OPERATING CONDITIONS
ADJUST OPERATING CONDITIONS	CHECK ROTATING EQUIPMENT	CHECK TOWER LEVELS & PRESS. & TEMP.	CHECK LUBRICATION	REACT TO CHANGES IN OPERAING CONDITIONS
ADJUST OPERATING CONDITIONS	CHECK ROTATING EQUIPMENT	CHECK TOWER LEVELS, PRESS.&TEMP.	CHECK LUBRICATION	REACT TO CHANGES IN OPERATING CONDITIONS
ADJUST OPERATING CONDITIONS	CHECK ROTATING EQUIPMENT	CHECK TOWER, LEVELS, PRESS. & TEMP.	CHECK LUBRICATION	REACT TO CHANGES IN OPERAING CONDITIONS
ADJUST OPERATING CONDITIONS	CHECK ROTATING EQUIPMENT	CHECK TOWER LEVELS, PRESS. & TEMP.	CHECK LUBRICATION	REACT TO CHANGES IN OPERATING CONDITIONS
ADJUST OPERATING CONDITIONS	CHECK ROTATING EQUIPMENT	CHECK TOWER LEVELS, PRESS. & TEMP.	CHECK LUBRICATION	REACT TO CHANGES IN OPERATING CONDITIONS

11	12	13	14	15
	REPORT PROBLEMS TO SUPERVISOR		IDENTIFY AND ORDER PARTS	
		FOLLOW FIRE FIGHTING PROCEDURES		
REACT TO ALARM CONDITIONS	MAINTAIN INSTRUMENTS (minor)	DETECT ABNORMALTIES	SHUT DOWN (EMERG.)	SHUT DOWN (PLANNED)
REACT TO ALARM CONDITIONS	MAINTAIN INSTRUMENTS (minor)	DETECT ABNORMALTIES	SHUTDOWN (EMERGENCY)	SHUTDOWN (PLANNED)
REACT TO ALARM CONDITIONS	MAINTAIN INSTRUMENTS (minor)	DETECT ABNORMALTIES	SHUTDOWN (EMERGENCY)	SHUTDOWN (PLANNED)
REACT TO ALARM CONDITIONS	MAINTAIN INSTRUMENTS (minor)	DETECT ABNORMALTIES	SHUTDOWN (EMERGENCY)	SHUTDOWN (PLANNED)
REACT TO ALARM CONDITIONS	MAINTAIN INSTRUMENTS (minor)	DETECT ABNORMALTIES	SHUTDOWN (EMERGENCY)	SHUTDOWN (PLANNED)
REACT TO ALARM CONDITIONS	MAINTAIN INSTRUMENTS (minor)	DETECT ABNORMALTIES	SHUTDOWN (EMERGENCY)	SHUTDOWN (PLANNED)
REACT TO ALARM CONDITIONS	MAINTAIN INSTRUMENTS (minor)	DETECT ABNORMALTIES	SHUTDOWN (EMERGENCY)	SHUTDOWN (PLANNED)
REACT TO ALARM CONDITIONS	MAINTAIN INSTRUMENTS (minor)	DETECT ABNORMALTIES	SHUTDOWN (EMERGENCY)	SHUTDOWN (PLANNED)

16	17	18	19	20
				INSTRUCT NEW TRAINEES
	ISSUE SAFE WORK PERMITS	ENSURE SAFETY REGS. OBSERVED BY CONTRACTOR	RENDER FIRST-AID	
START UP	ISOLATE EQUIPMENT	MAINTAIN EQUIPMENT (MINOR)		
START UP	ISOLATE EQUIPMENT	MAINTAIN EQUIPMENT (MINOR)		
START UP	ISOLATE EQUIPMENT	MAINTAIN EQUIPMENT (MINOR)		
START UP	ISOLATE EQUIPMENT	MAINTAIN EQUIPMENT (MINOR)		
START UP	ISOLATE EQUIPMENT	MAINTAIN EQUIPMENT (MINOR)		
START UP	ISOLATE EQUIPMENT	MAINTAIN EQUIPMENT (MINOR)		
START UP	ISOLATE EQUIPMENT	MAINTAIN EQUIPMENT (MINOR)		
START UP	ISOLATE EQUIPMENT	MAINTAIN EQUIPMENT (MINOR)		

A FOLLOW COMPANY & PLANT RULES & REGULATIONS

B COMMUNICATE EFFECTIVELY

C PRACTICE SAFETY AND FIRE FIGHTING

D DRIVE & SERVICE MOTOR VEHICLES

E OPERATE FRACTIONATION SECTION

F OPERATE GAS COMPRESSOR

G OPERATE REFRIGERATION SYSTEM

H OPERATE SWEETNING UNIT

J OPERATE DEHYDRATION SYSTEM

K OPERATE UTILITY SYSTEM

L OPERATE INLET SYSTEM

M OPERATE SULPHUR PLANT

DACUM PROGRESS SCALE	
Can perform this task in a superior manner and is capable of leading others in performing this task.	5
Can perform this task with more than acceptable speed and quality and with initiative and adaptability to special problem situations.	4
Can perform this task satisfactorily without assistance and/or supervision.	3
Can perform this task satisfactorily, but requires periodic supervision and/or assistance.	2
Can perform this task, but not without constant supervision and some assistance.	1
Cannot perfprm this task satisfactorily for participation in a work environment.	0

DACUM

DATE	BY	REVISION

SPEC

NETWORK FOR GAS-PLANT OPERATOR

N° 8165-154

[illegible] FORM [illegible]